



[From Franciscus Vallesius: Hippocrates. Coloniae, 1589.]

ANNALS OF MEDICAL HISTORY

NEW SERIES, VOLUME I

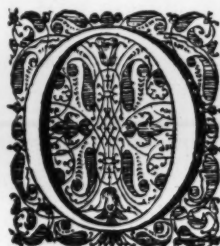
MAY, 1929

NUMBER 3

BATH OLIVERS—DOCTOR AND BISCUIT*

By E. B. KRUMBHAAR, M.D., PH.D.

PHILADELPHIA



OF the many who have enjoyed Bath-Oliver biscuits, who have not had their curiosity excited by this unusual hyphenate? A good trade name then, but based on logical grounds and not a mere catch thought of eighteenth century advertising. That the name interested, among others, the ever questing spirit of Sir William Osler is shown by three references to the subject in Cushing's Life,¹ separated by a seven-year interval. Oliver's Cornish origin and the coincidence of the initials, W. O., no doubt stimulated Osler's curiosity in

addition to having found some Oliver mss. at Oxford. After the letter written August 22, 1914, to Dr. J. W. Wigmore of Bath (who by the way was not able to find the original recipe) presumably graver and more tragic details occupied Osler's attention, as his inquiries were apparently never crystallized in anything written by him on the subject. They were sufficient, however, to stimulate the writer to look further into the matter and it soon became apparent that the man was worth investigating on his own account.² As a matriculate of the University of Leyden, Oliver's memory is appropriately honored at this Congress.

But why the Bath-Oliver biscuit? The circumstances attending the "invention" of the biscuit by Dr. Oliver

¹ Cushing, H. Life of Sir William Osler. Oxford, 1925, 2: 82, 412, 423.

² See Dict. of Nat'l. Biography, 42: 153.

* Read at the 6th International Congress of the History of Medicine, Leyden and Amsterdam, July 18-23, 1928.

are not known, but their commercial development is disclosed in the following naïve narrative:³



FIG. 1. SKETCH OF HOUSE IN BATH WHERE BISCUITS WERE FIRST MADE.

"My good Atkins," quoth the famous Dr. Oliver to his coachman, "You have been a trusty servant for many years, and now it is my desire to put you in a good position to earn a definite livelihood when I am gone. Accept the secret recipe of my wonderful Oliver biscuits, Atkins, and preserve it well. Accept also this gift of ten sacks of the finest wheaten flour, together with £100 in cash."

"Work, friend Atkins, as I have worked. Yes! Consistently and energetically, and you will most certainly prove a public benefactor to thousands who will appreciate Dr. Oliver's Biscuits, because they are so nutritious and distinctly good. Yes! Atkins, even to those suffering with impaired digestions or weakened appetites."

Though the present owners have no doubt that this story is authentic, it carries some intrinsic evidence of the apocryphal odor of modern advertising.

Atkins at any rate apparently lost no time in opening a small shop in Green Street, Bath, where he established himself as sole proprietor and maker of the biscuits. Some time later the business passed into the hands of the present owner, James Fortt, and the manufacturing is now

³ Pamphlet issued by Fortt and Co., Bath.

done in a large bakery on Manvers Street; but it is said that the quaint old shop, with its original furnishings



FIG. 2. BATH OLIVER BISCUIT LABEL WITH "PORTRAIT" OF INVENTOR.

and portrait of the inventor is still to be seen in Green Street.

According to the Grocers' Manual⁴ the biscuit should be crisp and of a fine texture:

In making the sponge add enough yeast to leave a slightly bitter taste and when properly fermented make into a dough, adding two ounces of butter for every pound of flour used, let the dough prove, then pinch off into one ounce pieces, mould round or roll thin with a bellied rolling pin, so they may be thinner in the middle than the edge; place two together, face to face, dock both sides, part and shake on floor of oven (after they have lain a little to prove up). They will burn a little in the middle which is correct for a good Oliver.

Although unprotected, except by the trade mark, the Fortt biscuit made from the original recipe (recently verified by a copy received from one of Dr. Oliver's descendants) is considered quite different from and

⁴ J. T. Laws, Liverpool, Editor.

superior to those made by other companies.

The Dr. William Oliver of biscuit

and to the Greenwich Hospital (1714 to his death in 1716). In 1707 he wrote a "Dissertation on Bath Wa-



FIG. 3. TITLE PAGE OF ESSAY BY THE ELDER WILLIAM OLIVER.

fame is not to be confused with an older Bath doctor of the same name, who also appears in the Dictionary of National Biography. This William Oliver, born in 1659 and like his namesake a student at this University (Leyden), and a Cornishman, acquired fame as surgeon to Monmouth's Expedition, escaping to Holland after its failure. Returning to England in 1688 with William of Orange, he was physician to the fleet (1693-1702), to the Chatham Hospital (1709-1714)



FIG. 4. OLIVER'S FRIEND, RALPH ALLEN, OF PRIOR PARK.

ters" that must be distinguished from the younger Oliver's "Practical Essay on the Use and Abuse of Warm Bathing in Gout."⁵



FIG. 5. PRIOR PARK. (FROM A CONTEMPORARY PRINT.)

The inventor of the biscuit, an abler and more distinguished man, was born at Trevarnoe, Cornwall, in 1695, was "admitted a pensioner" of Pembroke College, Cambridge, in 1714 and received his M.B. degree in

⁵ 1753; Ed. 3, 1764.

1720. He entered Leyden University November 15, 1720, but did not graduate, and practiced a few years

cornerstone was not laid till 1738, "for the benefit of all patients throughout the country except Bath" (a



FIG. 6. WILLIAM OLIVER (FULL FACE) AND JERRY PIERCE IN CONSULTATION. (FROM OIL PORTRAIT AT BATH GENERAL HOSPITAL.)

in Plymouth. He obtained his M.D. degree at Pembroke College in 1725, and five years later was made a Fellow of the Royal Society.

Coming to Bath in 1725, through his friendship with the celebrated Ralph Allen of Prior Park, and his relative, Dr. Borlase, both fellow Cornishmen, he soon obtained the leading practice in the city. The waters of Bath had long been known to have therapeutic value and as far back as 1597 an Act of Parliament had given the "right to the free use of the baths of Bath to the diseased and impotent poor of England"⁶—hence the "Beggars of Bath." This act, however, was repealed in 1714 and as there was no proper hospital for the treatment of patients with the Bath waters, in 1716 Lady Elizabeth Hastings and Henry Hoare proposed founding such a hospital. They were supported by Sir John Jekyl, the celebrated Beau Nash and the "famous Dr. Oliver, physician, philosopher and beloved citizen." The

⁶ Peach's "Life and Times of Ralph Allen, Lond., D. Nutt, 1895.

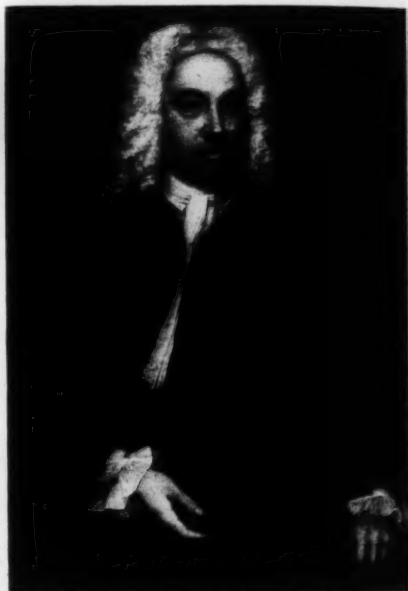


FIG. 7. WILLIAM OLIVER.

provision later revoked) and the hospital opened in 1742. On May 1, 1740, Oliver had been appointed physician to the hospital and his friend Jerry Pierce, surgeon. In 1742 they were painted together in the act of examining three patients, candidates for admission, by William Hoare, R.A. and the painting hung in the Board-room of the Hospital, where it may still be seen. The professional quarrels, so characteristic of the eighteenth century, were unfortunately not lacking in his case, but he at least seems to have been usually in the right. For many years Oliver prospered, but became afflicted with gout for several years before his death at Bath, March 17, 1764—another instance of a physician suffer-

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ing from the disease with which his fame is connected. He was buried in the Church of Weston nearby, "where

Quinn, the two Fieldings, Bishop Warburton, Beau Nash and many others were frequent visitors; as well

A PRACTICAL
ESSAY
 ON THE
 USE and ABUSE
 OF
WARM BATHING
 IN
GOUTY CASES.

By WILLIAM OLIVER, M.D.
 Of BATH.

BATH: Printed by T. BODDELY;
 And Sold by J. LEAKE, and W. FREDERICK, Bookellers;
 Also by J. BRINDLEY in New-Bond-Street, LONDON.
 MDCCLL

FIG. 8. TITLE PAGE OF FIRST EDITION OF OLIVER'S "PRACTICAL ESSAY."

an inscription on a white tablet supported by palm branches" was erected in his memory, as well as a mural tablet in the Abbey Church. His descendants were said to be living in Bath as late as 1852, and Fortt's recently was visited by a descendant now living in South Africa.

Oliver's friendship with Ralph Allen, the original of Fielding's Squire Allworthy in the novel *Tom Jones*, brought him in close touch with some of the leading figures of the day. This remarkable character, originally a poor boy working in the post-office, had made a large fortune while at the same time greatly improving the postal service of his country, a fortune which he spent in many philanthropic enterprises and in the formation of his magnificent estate at Prior Park. Here Pope, William Pitt, Gainsborough, the actors Garrick and

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*Nec, quia desperes invidi membra Glyconis,
 Nodosa corpus nolis prohibere chiragra.* HOR.

The SECOND EDITION,
 With ADDITIONS.

BATH: Printed by T. BODDELY:
 For JAMES LEAKE, and Wm. FREDERICK, Bookellers;
 And Sold by Messrs. HITCH, and HAWES, and M. COOPER,
 in Peter-nigger-Row, LONDON, 1755.

FIG. 9. TITLE PAGE OF SECOND EDITION OF "PRACTICAL ESSAY."

as our hero, the biscuit doctor. For Pope, Allen was one who would "do good by stealth and blush to find it fame," and his friend, Bishop Warburton (who to be sure had married Allen's niece), wrote of him: "He is I believe the greatest character of any age of the world." The account of his non-medical writings and activities in the *Dictionary of National Biography* exhibits a versatility such as is rarely to be found in the highly specialized world of today.

Oliver's chief medical work was his "Practical Essay on the Use and Abuse of Warm Bathing in Gout;" but the third of Charleton's "Three Tracts on Bath Waters" consisting of "histories of hospital cases under the care of the late Dr. Oliver" was mostly his work and also "Some Observations on Stomach Complaints" in the same volume.

From The Conclusions of his Practical Essay, I think, his opinions on gout can be well ascertained. Is there not something of value in them for us today?

* That bathing in hot baths is the most general solvent we know of all the humours of the body, whether natural, or morbid.

That the most general solvent is the most probable means by which obstructions of all kinds may be removed.

That the Gout arises from obstructions, formed in a particular series of vessels, through which its specific matter cannot pass any longer without the help of a fever.

That Gouts are of various kinds, and that their diversity depends upon the different sizes of the particles of that specific matter, the diameters of the vessels through which it should pass, the strength of the solids, and the height of the fever.

That the obstructing matter should be discharged out of the body as soon as possible after it has been dissolved, and brought again into the general circulation by warm bathing.

That 'till that be discharged, dissolving a fresh quantity, by repeated bathings, is very dangerous.

That previous evacuations are necessary to unload the habit, and clean out the first passages, amongst which vomits are often safe and useful.

That attenuating, and aperitive medicines, are proper to render the humours more fluid, and to open a free way by

which the dissolved molecules, which caused the obstructions, may be discharged with the secretions.

That bleedings, purgings, diaphoretics, and diuretics, are sometimes necessary to assist nature in the expulsion of the dissolved matter.

That too great a degree of heat in the Bath; too long a stay in it; too hot a bed after bathing; a profuse sweat too long continued; being exposed to cold air on bathing days; or eating or drinking too plentifully of high seasoned meats, or inflaming liquors, during a course of bathing are always improper, often dangerous, sometimes fatal.

That a course of bathing should be long, and by intervals, as the various effects it has upon the bather shall require.

That the head should in no case be dip't 'till the bather is rising out of the water.

That the temperate seasons of the year are most proper, safe, and useful, both for drinking and bathing.

That there can be no stated rules laid down, because the peculiar circumstances of each patient, which are very various, must be our guide in practice.

And from the whole I hope we learn, that by the prudent use of the hot Baths most chronic diseases, and gouty cases in particular, not in an inflamed state, may be relieved, and sometimes cured; while persons in high health may be greatly hurt, by wantonly sporting with so powerful an alterative of the present state of the animal machine, either from sickness to health, or from health to sickness.

The fifth, sixth and fourteenth points especially deserve perusal, while the twelfth is striking for its contrast to present usage.

How true is it also that "the chief cause of false judgments and different opinions amongst mankind about facts is that these are seldom truly represented, some circumstances being generally added or omitted, which, if

known precisely, would have altered the Idea of them in the mind of the Person to whom they are related.”⁷ An indication of Oliver’s exactness is found in the “Explanation of the Sense in which the Author uses the following Words in the foregoing Essay.” Many useless arguments would be avoided by medical men if the precise meaning of the terms they used were thus always indicated.

How, then, may we sum up this short estimate of the younger William Oliver? Apparently a worthy repre-

⁷ Ed. 3, p. 96.

sentative of the best of his profession of his day—an accurate and intelligent observer, industrious in recording his observations, and yet not afflicted with that unfortunate *cacoethes scribendi* (perhaps rarer then than today) and possessing sufficient leisure to cultivate the humanities and a profitable intercourse with his fellows. An authority on one of the most important diseases of his generation in the place where it was being most intensely studied; and yet his fame and his likeness are preserved for us mainly by a biscuit!



JULIUS MILLINGEN, LORD BYRON'S PHYSICIAN

By CASEY A. WOOD, M.D.

CHICAGO

WHEN I first visited Constantinople, in 1896, I was for a short time the guest of my friend, Dr. Edwin van Millingen,¹ one of the surgeons to the Imperial harem and personal attendant on the Sultan Abdul Hamid II. This practitioner belonged to a Dutch-English family several of whose members were prominent figures in the chronicles of the Near East during the eighteenth and nineteenth centuries and held positions of trust and responsibility under the Ottoman and other governments. Knowing that Mr. (Dr.) Julius Millingen, my host's father, had been one of Lord Byron's physicians and was with him when he died I was naturally curious to secure a first-hand account of the Grecian episode in the career of a writer whose poetry I had always admired.

The circumstances that led to the association of Julius Millingen with Byron are fully detailed in the interesting history² which the doctor himself published seven years after the poet's death. It is rather a rare volume, and I am indebted to the

¹ Some branches of this family adopted the form "Millingen" as the spelling of the family name, while others added (or revived) the prefix *van*, so that in various documents one finds Millingen, van Millingen, and occasionally Milligen.

² *Memoirs of the Affairs of Greece; containing an Account of the Military and Political Events, with various anecdotes relating to Lord Byron, and an account of his last illness and death.* By Julius Millingen, Surgeon to the Byron Brigade, etc. London: Printed for John Rodwell, Bond-Street, 1831.

Library of Congress for a recent perusal of it.

Since most of Byron's associates in Greece have published accounts of his participation in the Greek War of Independence, I have made myself familiar with the more important accounts for the special purpose of adding to the notes I gathered from Edwin van Millingen, and so that I might speak intelligently of the medical aspects of the struggle between two barbarous peoples. I say *barbarous*, because however much one may sympathize with a race fighting for freedom, the truth compels us to say that the partly organized Greeks were as innocent of the amenities of war and as devoid of any preparation for attending to the wants of their soldiery as were their Turkish oppressors. To murder captives, old men, women and children, to leave their wounded to die on the field and to make no pretence of providing hospital aid for the wounded who dragged themselves to the rear—that was the practice of both sides in this savage contest.

Fortunately for the medical historian, the sanitary, and purely professional phases of the war before, during and after Lord Byron appeared on the scene, are not to any extent subjects of controversy. It is not, consequently, difficult to record that portion of the story I heard from the lips of Dr. Julius Millingen's son, which, with the printed tales related by his other medical attendants and by such additional observers as one

may be inclined to believe, make a consistent chapter of some interest. It may be said here that there is no more reliable history of Lord Byron's career, including his romantic knight-errantry in Greece, than Moore's life of the poet.³

The self-appointed Greek Committee, formed in London (1823) to assist the insurgents in their efforts to throw off the Turkish yoke, looked about for medical men willing to join the Greek forces. In the campaign of the previous year hundreds of sick and wounded had died for the lack of medical care and comforts.

Young Millingen, who had "just terminated his studies [in England], inscribed his name among those of other candidates for so honourable an appointment; anxious to engage in a career so congenial to all friends of liberty." He was accepted and on August 27, 1823, provided with letters of introduction to the Greek Government and to Lord Byron, set sail for Greece. He arrived in Cephalonia (Samos), chief of the Ionian Islands, then a dependency of Great Britain, the following November. A few days later, he met the poet who, also a recent arrival, had as his personal medical attendant Dr. Bruno, an Italian from Genoa, highly recommended to his lordship.

They all came up together at this time to Metaxa and Byron explained that his stay in British territory was not due to any diminution of his Philhellenism. This fact was proved, he said, by his offer of 20,000 Spanish dollars as a loan to the Greek Govern-

ment. In purchasing value, this sum was equal to five or six times the same amount at the present time. Byron asked Millingen⁴ to remain with him until he embarked for Greece proper, and promised to give him employment in a corps he intended to raise when he reached the mainland. The poet also pointed out that the young doctor's professional services were sure to be highly regarded in a country where there was a dearth of medical men and where the title "doctor" was the best of introductions. Millingen was, in fact, to discover the truth of this statement when, after Byron's death, he fell into the hands of that stern, semi-barbarian Ibrahim Pasha, ruler of Egypt, who debated whether he would present the captive medico with the bowstring or give him an appointment as medical attendant to his harem. Fortunately for this narrative, Ibra-

⁴ If Britain furnished a head for the insurgent Greek Army, her recent colony gave her best blood to fill the post of Surgeon-in-Chief of the Greek Navy, in the person of that versatile genius and modest hero, Dr. Samuel Gridley Howe. In my judgment, he was Byron's compeer, and through him America contributed as great a share in accomplishing the release of Greece from the Turkish tyrant as did the great poet. But that is another story, to be read, briefly however, in Howe's own "Historical Sketch of the Greek Revolution," (N. Y., 1828) and in some of the pages of the "Proceedings of the Hundredth Anniversary of the birth of Dr. Samuel Gridley Howe, Nov. 11th, 1901," held in Tremont Temple, Boston.

Byron and Howe were fated not to meet, since the former had been dead several months when the young American doctor landed at Navarino to teach the demoralized rebels badly needed lessons not only in hygiene and the healing art but those canons of diplomacy and practical patriotism of a kind they knew as little as their savage oppressors.

³ MOORE, T. *Life, Letters, and Journals of Lord Byron*. Lond., 1839. 1 vol. with notes. A handy and complete edition of this well-known work, based mainly on 561 letters written by the poet himself.

him chose the latter alternative and finally permitted Millingen to return to England.

During the days spent together at Metaxta, Byron and his medical protégé became good friends and the blasé poet gave Millingen much sage advice, little of which, by the way, was followed by the older man.

Byron's dread of becoming fat, a family characteristic, is well known. Millingen several times heard him exclaim: "I especially dread, in this world, two things, to which I believe I am equally disposed—growing fat and growing mad; and it would be difficult for me to decide, were I forced to make a choice, which of these conditions I would choose."

A general discussion of this peculiarity fills several pages in numerous biographies of the poet, and there can be no doubt that fear of obesity was a constant, ghostly companion which refused to be laid. It was responsible for his abstinence from many articles of diet which he dearly loved. He, who was above all men a consumer of "forbidden fruit," had at least one temptation which he firmly resisted. Since the austerity of Byron's regimen has been much exaggerated by some imaginative writers, generally by those ignorant of dietetics, Millingen's intimate description of his hero's table habits is interesting, largely because it throws some light on "reducing" methods in fashion a hundred years ago.

While Millingen lived with him, Lord Byron took only one meal a day, viz., dinner at noon. Several dishes of meat were served at this repast but the poet refused them all, his custom being to eat meat once a month only. For him, dinner consisted of soup, a few vegetables, a consider-

able portion of English cheese, some fried crusts of bread and fruit—Millingen does not say how much of each. The discovery that *quantity* in the dietetic intake ranks with *quality* in warding off excessive adiposis was not appreciated by Byron and was probably unknown a century ago.

That the poet adhered strictly to the foregoing menu is shown by the following incident related by Millingen: Among the meat courses one day provided was a fine roast capon upon which the host cast hungry eyes; he was very fond of roast capon, and the dish powerfully tempted him. He was about to transfer a leg to his plate when, suddenly remembering his rule of life, he replaced it on the dish, ordering his servant to keep the bird until next day, when his month of abstinence would have expired.

Byron explained his single daily meal and his abstinence from meat on the ground that nothing blunted his mental powers more than substantial food or frequent eating, but Millingen believed that fear of becoming corpulent was his real reason for declining animal food.

This apprehension caused him to resort to other measures even more injurious to his well-being. He was not satisfied to limit his daily bill of fare by renouncing every sort of food which he considered nourishing, but he had recourse to drugs, especially to cathartic pills made of such drastic aperients as scammony, colocynth and gamboge.

As if such vigorous agents were not sufficient, he supplemented them by daily dosage with soda powders and calcined magnesia, to neutralize the acidosis produced by his irregular diet and his indulgence in Rhine wines and ardent spirits.

The poet was led to adopt these products of alcohol as "the least fattening" of the beverages that every gentleman drank, as a matter of course, in the early years of the nineteenth century. Ethyl hydroxide in some shape was then regarded by all classes, the medical profession included, as a liquid food of prime importance and great value, a dogma which Lord Byron, with all his scientific scepticism, never doubted; nor did he ever suspect the truth about this universal habit. Milligen goes on to say that his patient was guilty of two other alimentary sins: he ate rapidly and drank freely of alcoholic beverages *during* the meal. The poet clung to this injurious regimen for several years before his death. It was his habit to rise about half past ten, when he broke his fast by drinking a large basinful of strong green tea, without either milk or sugar. At half past eleven, he took horseback exercise for about two hours, then dinner at one o'clock, after which he retired to his study until dark. During the study hours he read, received visitors, played games and generally amused himself.

Milligen tells us that it was Byron's custom to indulge his passion for alcohol when reading; at almost every page he took a glass of wine or a mouthful of Holland gin, until he felt himself under the full influence of liquor. On such occasions, he was accustomed to pace up and down the room until three or four in the morning, and he claimed that these hours were most propitious to the development of his poetic fancy. As with Swinburne, his Pegasus flew best when partially intoxicated.

The young doctor comments on the situation as follows:

This mode of life could not but prove ruinous to his constitution, which however robust it might originally have been, must necessarily sink under shocks so powerful and so often repeated. The disagreeable symptoms of dyspepsia obliged him to have recourse to the daily use of pharmacy which, instead of annoying him, seemed to be a business of pleasure, persuaded, as he was, that there was no other way of obviating the misfortune of corpulency: but after the evanescent stimulation of alcohol had subsided, hypochondriasis, the inseparable companion of intemperance, plunged him in a condition often bordering on despair.

My friend, Dr. Edwin van Milligen, told me that, in his opinion, the influence gained and exerted over Byron at Mataxta and Missolonghi by his father was due not so much to the latter's professional skill or services, as to a sort of comradeship which arose between the principals. Byron showed as much affection for the young doctor as it was possible for a man of his extraordinary character to feel for another human being of the same sex. Very likely it was to oblige Milligen that the poet consented, after some difficulty, to have two other physicians called in during his last illness; but he exacted a promise that, during the "examination" and during their stay in his room not a question should be asked nor a word uttered. Notified of these conditions, the two consultants gravely inspected the patient's tongue, felt his pulse, observed his symptoms as shown by bodily appearances and, after this perfunctory performance, withdrew in solemn silence to a neighboring room.

During the inspection Byron kept his eyes on Milligen and more than

once said, "See that you keep your promise."

The young *dottore* left Metaxta for Missolonghi a short time before Byron arrived on January 6 (Millingen says the 5th), 1824. The latter soon tired of inaction and set about establishing a hospital and medical dispensary, but he was at once confronted by unexpected obstacles in this attempt to relieve the distress of the population. The higher clergy, the military leaders, the *capitani*, all classes, were unanimous in applauding the efforts of the frank doctor to help the sick and wounded who continuously sought shelter in the town. On hearing that the London Greek Committee and the Society of Friends had sent, at their own expense, a trained medical man with instruments and medicines, the Greeks were loud in their expressions of gratitude and praise, but when the chief of the Commission suggested that they themselves do something towards the enterprise, for example to allot a house (taken from the Turks) for the reception and care of the sick, to help to furnish it and to allow a very moderate sum for maintenance, they rejected the proposition *in toto*.

Millingen tells the story:

After many protestations of utter poverty, unequalled by those of the most eloquent mendicant, they declared themselves unable to complete the charitable work. It certainly required no small share of barefacedness to make such assertions when so many of them wore rich dress and glittering arms; with gold coins adorning the tresses of their wives and linked doubloons forming a triangular breastplate any one of which would suffice to defray the owner's share of his sick contribution for years to come.

Nothing can throw more light on

the true character of the Western Greeks than this incident, or depict in truer colors their attitude towards those who endeavored to help them in their struggle for political freedom. To take all and give nothing that cost them anything in the shape of money or sacrifice seemed their settled policy. Byron labored under no delusion as to the situation. He believed and said quite openly that it was partly centuries of brutal oppression and cold-blooded injustice which had converted the Greeks into imitators of their Turkish tyrants, but he was anxious to assist in raising them from their present state of degradation, in the hope that the semi-barbarous, ignorant, self-seeking population of the Isles of Greece might have an opportunity of regaining something of their ancient glory.

There were, as he knew, a few informed and really patriotic men among them but even the better educated leaders were continually at loggerheads and rarely was there concerted action in the carrying out of any program, political, naval or military. That the revolution made any progress at all was due to the ineptitude of the enemy, the lack of military roads, the ruggedness of the country and the intermittent guerilla warfare of the Greeks rather than to the success of any regular plan of campaign.

This brief reference to Greek morals, in part a reflection of Turkish misrule, did not discourage Dr. Millingen. Although there was no hope of inducing the Missolonghites to contribute to the establishment or support of a hospital, he, with the permission of his chief, gave notice that a public dispensary would be opened on January 10, and that

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advice and medicines would be given gratis to the poor and to soldiers. Others would be treated for a moderate fee. Sick calls were also to be made at the homes of patients.

Julius Millingen, mainly through Lord Byron's influence and at his request, was appointed Surgeon-in-Chief of the Greek Army, a position he held for more than a year.

It was more a post of honor than of emolument. His pay, two pounds a month, was usually several months in arrears. Our youthful practitioner became very popular in Missolonghi and soon had such a large public and private practice that he was rarely able to secure a fair night's rest.

Byron continued to indulge in strong waters. One evening, after a bout of immoderate indulgence in punch with a boon companion, he fell on the floor "agitated by violent spasmodic movements of all his limbs. He foamed at the mouth, gnashed his teeth and rolled his eyes like one in an epilepsy." In a few minutes, the seizure passed and although his senses seemed confused, he soon recovered but not without professional interference (*ubi medici duo*). We read in the Millingen account that "Doctor Bruno proposed opening a vein; but finding it impossible to obtain consent (the patient was always opposed to the fashionable fad of phlebotomy) he applied leeches to the temples." Physically, things went on from bad to worse with the poet; flashes before the eyes, palpitations and faintness were added to his digestive troubles and the accompanying erethism became chronic. On one occasion, Millingen had a long and serious talk with the invalid and exerted all his influence to persuade him to reform his malhygienic habits, with the assur-

ance that it was not too late to regain possession of his mental and bodily health. To these entreaties his lordship made reply:

Do you suppose I wish for life? I have grown heartily sick of it, and shall welcome the hour I shall depart from it. Why should I have regrets? Can life afford me any pleasure? Have I not enjoyed it to a surfeit? I am, literally speaking, a young old man [he was aet. thirty-six]. I have travelled, satisfied my curiosity, lost every illusion; I have exhausted all the nectar of the cup of life; it is time to throw the dregs away. Only the apprehension of two things now haunt my mind. I picture myself slowly expiring on a bed of torture, or terminating my days like Swift—a grinning idiot! Would to heaven the day were arrived in which, rushing sword in hand on a body of Turks, I might meet immediate death, the object of my wishes.

Millingen makes no comment on these hypochondriacal expressions but his efforts towards reform of his patron's mode of living were unavailing. On the ninth of April, three months after Byron's arrival in Missolonghi, he was caught in a rainstorm and was wet through and chilled. Millingen found him feverish and with a sore throat. The patient grew worse, had attacks of "shuddering and pains in his head and bones." Bruno (as usual) strongly advised bleeding; the patient (as usual) strongly objected.

On the fifteenth, Millingen was called in and was informed by Bruno that his patient had rheumatic fever, that the pyrexia had much increased and that phlebotomy was plainly indicated. Would Mr. Millingen add his entreaties to that end?

The minutes of the consultation as recorded by the consultant are important because they show that Byron,

with no pretence of medical authority but widely read and endowed with acute powers of observation, was able to sense the fallacy of a supposed remedy backed, as it was, by two friends in whose knowledge and judgment he had as much confidence as his sceptical attitude towards life permitted him in dealing with any problem.

In his report, Millingen tells us that he was convinced, after an examination of the patient, that blood-letting was absolutely necessary and he endeavored as mildly and gently as possible to persuade Byron of its urgency, but in spite of this diplomacy, the temper of the unfortunate invalid proved "so morbidly irritable that he refused in a manner exceedingly peevish. He observed that of all his prejudices the strongest was against phlebotomy . . . and that whatever we might say, his aversion was stronger than any reason he could give." Besides, argued his lordship, does not Dr. Reid⁶ claim in his *Essays* that less slaughter has been effected by the warrior's lance than by the physician's lancet?

Dr. Millingen reminded him that this remark related to the treatment of nervous disorders and not to inflammatory conditions, to which the patient replied angrily:

Who is nervous if I am not? Do not these words, besides, apply to my case? Drawing blood from a nervous person is

⁶ REID, J. *Essays on Insanity*. Lond., 1816. *Essays on Hypochondriasis and other Nervous Affections*. Lond., 1817, 1821.

It is a tribute to Byron's range of reading and his remarkable memory that he was able to dispute, off hand and in their own temple, with these doctors of the healing art, and to confront them with an authority opposed to what was universally regarded a fundamental dogma of therapeutics.

like loosening the chords of a musical instrument, the tones of which are already defective for want of sufficient tension. Before I became ill, you know yourself how weak and irritable I had become. Bleeding, by increasing this state, will inevitably kill me. Do with me whatever else you please, but bleed me you shall not. I have had several inflammatory fevers during my life, and at an age when I was much more robust and plethoric than I am now; yet I got through without bleeding. This time, also, I will take my chance.

Calmly considering (after the lapse of a hundred years) the pros and cons of the debate, we may properly award the decision in the patient's favor; certainly Byron's *argumentum ad judicium* has been amply confirmed by subsequent experience.

Neither Bruno nor Millingen, however, gave their client any chance of escape. After much "reasoning and entreaty," he agreed that if his fever increased at night (subtle doctors!), he would allow Bruno to bleed him; and as a parting shot he was given, "with a view of lowering the impetus of the circulating system, and determining to the skin," an ounce of a solution containing half a grain of tartarized antimony and 2 drams of nitre in 12 ounces of water.

And now follows a recital which would have won the approval of a Sangrado, not to mention more substantial personages like Broussais, Bouillaud and their following. We have, in the Millingen narrative, a true picture of the treatment of "inflammations" commonly followed by the average physician in the beginning of the nineteenth century. His story is practically identical with the statement of Count Gamba,⁷ Byron's secretary and intimate friend.

⁷ Gamba, P. *A Narrative of Lord Byron's Last Journey to Greece*. Lond., 1825.

In the early morning of April 16, Millingen called on his patient, who informed him that, having passed a better night than he expected, he had not asked Bruno to bleed him.

Chagrined at this, I laid aside all consideration for his feelings, and solemnly assured him how deeply I lamented to see him trifle with his life in this manner. I told him that his pertinacious refusal to be bled had caused a precious opportunity to be lost; that a few hours of hope still remained; but that unless he would submit immediately to be bled, neither Dr. Bruno nor myself could answer for the consequences. He might not care for life, it was true; but who could assure him, unless he changed his resolution, the disease might not operate such disorganization of his cerebral and nervous system as entirely to deprive him of his reason? I had now touched the sensible cord; for, partly annoyed by our unceasing importunities, and partly convinced, casting at us both the fiercest glance of vexation, he threw out his arm and said in the most angry tone: "Come; you are, I see, a d-d set of butchers. Take away as much blood as you will; but have done with it."

They seized the opportunity, and drew about 20 ounces. On coagulation, the blood presented a strong buffy coat. Yet the relief that followed did not come up to their expectations; during the night the fever was higher than before the bleeding, the restlessness and agitation increased, and the patient spoke several times in an incoherent fashion.

On the morning of the seventeenth the bleeding was repeated; for, although the alleged rheumatic symptoms had completely disappeared, "the cerebral ones were hourly increasing and this continuing all day we opened the vein, for the third time, in the afternoon. Cold applications were from the beginning con-

stantly kept on the head; blisters were also proposed." When the latter were applied Lord Byron requested that those for the lower extremities be applied to one leg only or above the knee of his lame leg;⁷ he objected to anyone seeing his defective foot.

Despite all bleedings, blistering and sudorifics the disease rapidly developed and Millingen places stress upon the decided nervous symptoms, the twitchings and involuntary motions of the tendons.

On the morning of the eighteenth, a consultation was proposed to which Dr. Lucca Vaga and Millingen's assistant, Dr. Freiber, were invited; but the four doctors could not agree on the treatment. Bruno and Lucca proposed antispasmodics and such other agents as were in that day employed in the last stage of typhus. Millingen and Freiber argued that if the patient's present condition were due to a metastasis of the rheumatic inflammation (as they all agreed) then "antiphlogistic measures could never prove hurtful in the case; they would become useless only if disorganization had set in, when any

⁷ Colonel Fielding H. Garrison has, at my request, sent me the following note on this subject: "The only thing I can find about Byron's lameness is the statement in Tre-lawney's Records that the *tendo Achillis* of each foot was contracted to such an extent that he had to walk on the balls of his toes and that the right foot was distorted and bent inwards. I doubt if the orthopedists of that time had any particularly accurate name for the condition as Byron was born long before Delpech and Stromeyer had introduced their famous achillotomy for club-foot during 1816-21. Byron's condition was worsened by faulty treatment." Whence one may, perhaps, conclude that the Poet was born with a decided *talipes equinovarus* right, and in addition had either a true or a compensatory, acquired (false) *talipes equinus* of the left foot.

means would be superfluous." They recommended the application of numerous leeches to the temples,



TWO CYPRIOTE LACHRYMARIA (?) AND A FUNERARY URN FROM LORD BYRON'S COLLECTION. THE POET GAVE THEM TO HIS PHYSICIAN, JULIUS MILLINGEN, FROM WHOM THEY WERE INHERITED BY DR. EDWIN VAN MILLINGEN WHO PRESENTED THEM TO THE AUTHOR. THEY ARE NOW IN THE LIBRARY OF STANFORD UNIVERSITY.

behind the ears and along the course of the jugular vein; also a large blister between the shoulders and sinapisms to the feet. As Bruno had the deciding vote an "antispasmodic," a strong solution of valerian with ether etc. was administered and the dose repeated in half an hour; but the convulsive movements and the delirium increased, the patient became more and more comatose and died next day, April 19, 1824.

Count Gamba emphasizes the fact that Byron suffered more from severe, almost constant pains in his head than from any other symptom, and further notes that the two phlebotomies yielded 2 pounds of blood, that the

patient was unable to sleep, that he perspired freely on the head and neck and that "the disease seemed attacking the head." He also remarks that it was not until two days before Byron died that his attendants became really alarmed, and that on the eighteenth they announced that there were symptoms of inflammation of the brain. A third bleeding was then begun but it was stopped by Lord Byron himself.

The autopsy, as part of the embalming process, revealed that the cranial sutures were obliterated. The skull was that of an old man, the diploe was absent, the osseous tissue being as hard and compact as ivory. The *dura mater* was markedly thickened and attached by organized bands to the surrounding parts; its blood vessels were dilated and highly injected. The falciform process, greatly inflamed, was firmly adherent to the hemispheres. The *pia mater* looked like a deeply injected conjunctiva. "The whole system of sanguiferous vessels both of the cerebrum and cerebellum were gorged with blood and their substance was surprisingly hard."

The ventricles contained several ounces of serous fluid. The other internal organs, except the liver and heart, were normal. The cardiac substance resembled that of extreme old age; the liver showed the sclerotic changes of chronic alcoholism. The report was signed by all four attendants.

I pass over, as relatively unimportant, the rather personal and acrimonious dispute over certain aspects of the conduct of this *cause célèbre* indulged in by Bruno, who was quite evidently jealous of Millingen's favor with the Poet, and the other

attendants. It is fully ventilated in the *Westminster Review*, the *Telegrafo Greco* and in other journals of the time. The main questions at issue—whether this, that or the other treatment ought or ought not to have been given—we now know to have been of little moment. No measures available in 1824 could have saved the patient's life nor have sensibly prolonged it. Probably the heroic measures adopted hastened the end.

Of the practitioners engaged by Byron, young Millingen appears to best advantage, and we suspect, from what is known of his subsequent career, that he was by far the best equipped mentally and professionally of all the advisers of the brilliant poet.

From the foregoing one may conclude that an opinion as to the predisposing and final cause of death in Lord Byron's case must be purely speculative. He had completely burned the candle of life at both ends and the fitful flame was easily extinguished.

The sole excuse for introducing the accompanying pictures of Cypriote pottery is that they may have some slight interest for the medical historian; they formed part of a small collection given by Lord Byron to his friend and physician, Julius Millingen. From the latter they passed to his equally celebrated son, Dr. Edwin van Millingen of Constantinople, who presented them to the present writer. He, in his turn, has donated them to the Library of Stanford University, where they will find a fitting and final resting place.

These examples of early pottery are of no great archeological or commercial value; they consist of one decorated and one plain (so-called) lachrymatorium and a small and rather graceful funerary urn, all said to have been discovered in Cyprus and dating from the early Roman period.

I am much in the debt of Lt. Col. Fielding Garrison for reading the foregoing manuscript and for offering valuable suggestions during its preparation.



"THE CASTEL OF HELTH" AND ITS AUTHOR, SIR THOMAS ELYOT

By W. G. AITCHISON ROBERTSON, M.D., D.Sc., F.R.C.P.E.

EDINBURGH

SIR Thomas Elyot, one of the most outstanding in the galaxy of remarkable men of his time, was born about the year 1490 and probably in the county of Wiltshire, though there is no real assurance on this point. His active life was passed during the reign of Henry VIII, and he partook to the fullest extent in all the vicissitudes of that troublous period. Though sent as an ambassador on two occasions (and neglected by his royal master on both of these) he never acquired that position to which his undoubted abilities entitled him. There can be little doubt but that his association with many eminent Roman Catholics engendered a prejudice against him, especially by the King and by Cromwell, who may have considered that it would not further their ends to place him in any position of power. Learned men are not always capable men, and there may have been wanting in Sir Thomas that something which is required in those appointed to posts of power and trust. It must be confessed that he both lived and died a disappointed man. He had read widely, and into the numerous works which came from his pen, he incorporated much of his reading. His books were highly appreciated by his fellows and numerous editions of them appeared both during his life and after his death.

He says himself that he "read every ancient work, Greek and Latin, that he could come by containing

any part of philosophy necessary to the institution of man's life in virtue."

He was one of the first to employ the English language in his writings. In this way he incurred the anger of the physicians who told him that he should confine his attentions to histories. To this Elyot answered:

If physicians be angry that I have written physicke in English, let them remember that the Greeks wrote in Greek, the Romans in Latin, Avicenna and the others in Arabic, which were their own proper and maternal tongues. And if they had been as much attacked with envy and covetise, as some now seem to be, they would have devised some particular language with a strange cipher or form of letter wherein they would have written their science, which language or letters no man should have known, that had not professed and practiced Physicke. But those, although they were Paynims and Jews, yet in this part of charity, they far surmounted us Christians, that they would not have so necessary a knowledge as Physicke is, to be hid from them which would be studious about it.

Elyot's aim was to make known to people generally that knowledge which he had acquired through such long and arduous study. To have written this in Latin, as was the usual method with the learned, would have limited his teaching to this class and would have defeated the very object he had in view.

His father was Richard Elyot who held many lucrative appointments under Kings Henry VII and VIII, with

both of whom he must have been held in estimation. In 1503 he was Commissioner for the County of Wilts and collected the "aids" or money required by the King for knighting the Prince of Wales and for marrying the Princess Margaret to the King of Scotland. Richard also had held such appointments as Trustee for the Crown, Sergeant-at-law, and Attorney-General to the Queen Consort, and he held up to the time of his death the post of Justice of Assize on the Western Circuit.

It is not surprising that a father so learned should desire that his son should receive a thorough education.¹ The Universities of Oxford and Cambridge held no great reputation at this time, so young Thomas was placed by his father under such tutors as John Collet, who afterwards became Dean of St. Paul's and who profoundly influenced the religious views of Erasmus; Linacre who had a profound knowledge of Greek which he had acquired in Italy, and who founded the Royal College of Physicians. Richard Croke was another of his teachers who was so well versed in Greek that he lectured on it both in Leipzig and in Cambridge. William Lilly, the classical grammarian, Hugh Latimer and others all instilled into the receptive mind of Thomas Elyot the best learning of their day.

His legal education was supervised by such men as Sir Thomas More; and thus brought up in an atmos-

¹ Professor Lawrie gives a sketch of Elyot's education in his "History of Educational Opinions since the Renaissance," 1903.

Prof. W. H. Woodward gives an account of Elyot's life in his "Education in the time of the Renaissance," 1906.

H. H. S. Croft in his preface to a reprint of "The Governour" gives a full account of Elyot's life and work.

phere classical, theological and legal there was everything to develop that philosophical attitude of mind which

Th. Elyot Knight.



FIG. 1. SIR THOMAS ELYOT. FROM A DRAWING BY HANS HOLBEIN AND ENGRAVED BY F. BARTOLOZZI. IN HIS MAJESTY'S COLLECTION AT WINDSOR CASTLE.

is so strongly shown in all Elyot's works. In his "Address to the Reader" which prefaces the first edition of his "Dictionary," he tells that he received his education at home in all the liberal sciences including philosophy and letters. It was however to his teacher Linacre, that he was most indebted for his knowledge of the Greek and Latin languages. To him also Elyot owed that interest in medical subjects which he pursued all his life. Linacre had translated the works of Galen from Greek into Latin, and together they must have studied them, and "afterwards of mine own studie, I redde over in order the moste parte of the workes of Hippocrates, Galenus, Oribasius,

and others which were their aggregatours and followers." (Proheme to the Castel of Helth.)

That he must have profited by his studies is shown by the fact that in 1511, when still a very young man, his father secured for him the appointment of Clerk of Assize for the Western Circuit—a post which Elyot in one of his own letters, says was worth nearly a hundred marks—a sum about equal to £800 at present value.

About the year 1517 his father received the honor of Knighthood, and died early in 1522. He possessed properties at Chalk and at Winterslow near Salisbury, and resided there when not in his chambers in London. Sir Thomas must have spent part of his youth in these country districts, and in his "Dictionary" he relates that once when at Ivy church near Salisbury, he and his father watched some workmen unearthing the skeleton of a giant which measured 14 ft. 10 in. long (quoted by the antiquary, John Leland).

Sir Richard gave instructions that he was to be buried in Salisbury Cathedral, but as no tomb was to be placed on his grave it is not known where his resting place really is. By his will he set aside his lands at Chalk for providing masses for his own soul and "for his frendes soules and all Christian soules." His son now entered into possession of the estate of Combe near Woodstock in Oxfordshire.

In 1523, through the death of his cousin Thomas Fynderne, Elyot became entitled to certain estates in Cambridgeshire near to Newmarket. The succession was however disputed and the legal actions caused him much expense: "The saide sute contynuyng one yere and a half, stooode

me above one hundred pounds." The case ultimately came before Chancellor Wolsey, who "by his good justice, gave me good comfort." That Wolsye must have had a high opinion of his merits is shown by his appointment of Elyot as Clerk of the Council, "for some good oppynion that he conceyvyd of me withoute my merites, withoute my sute or desyre." This was in 1524.

In November 1527 he was appointed Sheriff of Oxfordshire and Berkshire.

Though the dreaded "sweating sickness" had been ravaging England for several years, it broke out in epidemic form in London in 1528; and the friendly relations between the two are indicated by a letter from Elyot to Wolsey inviting the latter to come and stay at his house at Combe so as to avoid the disease. So heavy did he find the work as Clerk to the Council that he resigned his Clerkship of Assize this same year. He complains that he had received no salary for the former post:

So by the space of six yeres and a half I servyd the King not in the Starre Chamber onely, but in some other thinges pertaynyng to the Clerk of the Croune, some to the Secretaries, and other travailes which I will not now reherce and all this time without fee, withoute reward more than the ordinaire, and that which grevith me withoute thank of the King, which I deseruyd, as it wold appear if His Grace hadd ben truly infourmed of me, and my drawghtes seene which I devised and made to my sayde Lord. In this unthankfull travayle I no thing gate but the Colike and the Stone and all moste contynuall destillations or rewmes ministres to abbreviate my lif. [This is from one of his own letters quoted by Ellis in his "Original Letters."]

In 1530 his Clerkship to the Council was taken away from him, "without any recompense, rewarded onely with the Order of Knighthode, honorable and onerouse, having moche lesse to lyve on than before." This same year his name is found on the roll of Commissioners of Gaol Delivery for both Castles of Oxford and Cambridge. He was also appointed one of the Commissioners to inquire into and take evidence on oath regarding Wolsey's possessions in Cambridgeshire. About this time he married Margaret Atbarrow of North Charford near Salisbury. He had probably met her at the house of Sir Thomas More.

In 1531 Elyot published his most celebrated work, "The Boke named the Governour." It is probably the earliest treatise on moral philosophy in the English language, and is said to have been modelled on the work of Francesco Patrizi entitled "De Regno et Regis Institutione," which was published in Paris in 1518 and went through many editions. Although Elyot borrowed largely from this book, he never even mentions the author.

In 1523 there had also appeared a work by the Spanish humanist, Juan Luis Vivès, entitled "De Tradendis Disciplinis," in which he advocated that instruction should not be given in Latin but in the mother tongue. Vivès was in England during the marriage of Catherine of Aragon to Henry VIII in 1509. In 1523 he became tutor to Princess Mary and also taught at Oxford, so that in all probability, Elyot not only knew the author but also his books.

The "Governour" was dedicated to King Henry VIII, and soon brought the author fame and success. Within fifty years eight editions had appeared.

Elyot's object in writing the book was to obtain a better education for the sons of noblemen, who later would be likely to occupy exalted positions, and to instill into their minds those principles of morality which ought to regulate their conduct.

Mainly through the influence of Wolsey and Cromwell, Elyot was appointed Envoy of the King to Charles v, Emperor of Germany. Though his mission was mainly to secure the consent of the Emperor to Henry's divorce from Catherine of Aragon, he was instructed to look for and apprehend Tyndale if possible. We find Elyot complaining of the treatment or neglect which his royal master was giving him when abroad, namely, that his letters remained unanswered, and that he received no further instructions, but especially about the smallness of his salary which was quite inadequate to cover the great expenses necessary to his position. Probably as a consequence of this, he held the post for but a short time, returning to England in the spring of 1532. Later in this same year another office was given to him, when he was appointed Sheriff of Cambridgeshire. This post would again have caused him greater financial liabilities than he felt himself able to meet, so he wrote twice to Cromwell begging him to cancel the appointment, but without success. He held this Sheriffship for but one year, however. Elyot was in London in 1533 superintending the publication of his "Pasquil the Playne" (no copy of which book now exists) and also "Of the Knowledge which maketh a Wise Man." The latter work is in the form of a dialogue between Plato and Aristippus: "touchynge the title of my boke, I considered that Wisdome is spoken of much more than used."

royal library. This work was published in 1537. He presented to his old friend Cromwell a copy which is now in the library of the British Museum. On the flyleaf is a complimentary letter written in Latin by Elyot himself.

About this time also he was engaged in translating from Plutarch what he entitled "The Education or Bringynge up of Children," and "The Defence of Good Women."

His doubtful friend Cromwell was attainted and executed in 1540 and after this Elyot was able to secure some of his property in Cambridgeshire. In this year also there was published "The Image of Governance, compiled of the Actes and Sentences notable of the moste noble Emperour Alexander Severus, late translated out of Greeke into Englyshe by Syr Thomas Elyot, Knight, in the favour of manuscript nobylitie." The author declared that he had received the manuscript from a gentleman in Naples, but Sir Henry Wotton affirmed that it must have been the product of Elyot's own brain and no translation.

In 1542 he was returned to Parliament as a Member for the Borough of Cambridge. "A Preservative Agaynste Deth" written in 1544 was the last of his many literary efforts and was published in 1545. It consists of passages drawn from Holy Scripture and from the Fathers of the Church.

He had for long suffered from ill health and died on March 26, 1546, and was buried in the Church of Carleton in Cambridgeshire. A monument was placed over his grave, and a large brass engraved with the portraits of himself and his wife. A description of this monument was given by a traveller in 1632, but it long since has disappeared. William Dow-

sing, the iconoclast, who "purged" over one-hundred and fifty churches in Suffolk of stained glass, brasses, paintings and other relics of popery, says in his "Journal," "Carleton cum Willingham. March 22 [1643?]. A crosse on the steeple promised to be taken downe, and we brake diverse superstitious pictures." So it is by no means improbable that the tomb of Sir Thomas Elyot was amongst those that were destroyed.

It is not my intention to take any general survey of Elyot's literary productions, but to confine the present essay mainly to one, and that the one of chief interest to medical men.

Several of Elyot's works are really compilations drawn from classical or religious writers, and even the work by which he is best known to the literary world of today, "The Boke named the Governour," is by no means the product of his own brain. It was not the first book by any means dealing with the training of princes, nobles and others destined to occupy positions of authority; but it was the first work of its kind written in the English language, and we are therefore not surprised to know that it soon drew great attention not only to the subject itself but to the author. Up to Elyot's time every scholarly work had been written in Latin and so the books were not accessible to the public generally. It was his intention to make such knowledge "popular," and to make the fruits of his inquiry into classical lore, religious truth and medical matters common to the ordinary reader. That a treatise like "The Governour" could ever be popular in this sense was not to be expected, because it could appeal only to the wealthy upper classes from whom

governors were drawn, yet it explained in common language how best to train and educate children for high positions.

If ye bringe them up and instructe them in suche fourme as in this boke is declared, they shall than seme to all men worthye to be in authoritie, honour and noblesse, and all that is under their governance shall prospere and come to perfection. And as a precious stone in a ryche ouch [jewel] they shall be beholden and wondred at, and after the dethe of their body their soules for their endeavour shall be incomprehensibly rewarded of the gyver of wisdom, to whome onely be gyven eternall glorie. Amen.

It is really a treatise on education, how best to train and instill knowledge into the young; not necessarily those destined to fill high positions, but applicable to every young person. In this way Elyot's "Boke" was not only valuable to those of his own time, but to all times and to every class of society.

He lays much stress on the careful selection of a proper nurse, and recommends that the child should be brought up to speak pure English as well as Latin and colloquial languages. From the age of seven, instruction is to be given in the Greek language. Elyot anticipated the modern method of teaching foreign languages, for he says "detain not the child too long in the tedious grammar. Let not the child's fervent desire of learning become extinct by the time he cometh to the most sweet and pleasant reading of old authors." At the age of seventeen, the youth should begin the study of moral philosophy, reading Plato, Aristotle's Ethics and Tully's Offices. Music, drawing, carving, geometry, astronomy and cosmography were all to be learned and

attention was to be given to gymnastics and to archery.

As in our own time, and as I suppose in every epoch, Elyot laments the falling off of learning in his time. He suggests that it is due to the want of learning in the teachers themselves, and thinks that the poor salaries offered was the reason." The avarice of parents causes them chiefly to inquire with how small a salary a teacher will be contented."

In the Proheme he says:

I have now enterprised to describe in our vulgare tunge the fourme of a juste publicke weale, whiche mater i have gathered as well of the sayenges of moste noble autours (grekes and latyns) as by myne owne experience, I beinge continually trayned in some dayly affaires of the publicke weale of this your moste noble realme all moste from my chyldhode. Whiche attempt at is not of presumption to teache any persone, I my selfe haveinge moste nede of teachinge, but onely to the intent that men which wil be studious about the weale publicke may fynde the thinge therto expedient compendiously written . . . I do now dedicate it unto your hyghnesse as the fyrste frutes of my studye.

Of all Elyot's works the one which is of chief interest to medical men is his "Castel of Helth." We have seen that he had studied under the famous Linacre not only classical but also medical writers, and as with the preceding work so with this, his desire was to make available to those who knew no Latin the knowledge which he had acquired with such trouble. Up to this time the practice of medicine had been mainly in the hands of the ecclesiastics, who had received little or no instruction in it.

The publication of what we may term a popular guide to medicine

naturally aroused much adverse criticism from the medical profession. This was due to the fact that the profession was a "closed" one, and also to the fact that it was written by a layman for the use of the public.

A letter in the Harleian ms indicates that Elyot had dedicated the book to his friend Cromwell. It is addressed:

[To] My speciall assurid frende Mr. Cromwell, Treasurer of the Kinges Jewelles. Wherin if ye finding sufficient leysour (as it will be hard for you to doo) and will spend a few houres I doubt not but that your goode witt shal finde more frute than ye wolde looking for of any thinge that sholde have passid from my folissh hedd . . . and if it shall please you to recommend one of these bookes unto the Kinges highnes when ye shal fynde therunto opportunitie, I conforme me to your pleasure, sens this is the last Englishe booke which I pourpose ever to make, onelass the desyre of some speciall frende doo compell me.

There is no special dedication in the book itself.

There is before me now, not the first edition, but a later one: "The Castel of Helth corrected and in some places augmented by the first author thereof Sir Thomas Elyot, Knight, the yere of our Lorde 1541 [in the marginal border the date 1534 is given]. Imprinted at London in Fletestrete in the house of Thomas Berthelet."

In the Proheme, Elyot writes that:

Galen the moste excellent Phisicion feared that in writing a compendious doctrine for the curyng of sicknesse, he should loose all his labour, for as much as no manne almost dydde endeavour hym selfe to the findyng of truth, but that all men dydde so much esteme riches, possessions, authoritie and pleasures, that they supposd them which were studious

in any part of Sapience, to be madde, or distract of their wyttes. Why should I be greved with reproches, wherewith some of my countrei do recopenc me, for my labours taken without hope of temporale reward, only for the fervent affection whiche I have ever borne toward the publicke weal of my countrei. A worthy matter, saith one, for Thomas Elyot is become a Phisicion and writeth in Phisicke, whiche beseemeth not a knight, he mought have beene muche better occupied. And why, I pray you, should men have in disdaine or small reputacion, the science of phisike, whiche beyng well understand, truely experienced and discretely ordred, doth conserve helth, withoute the whiche all pleasures be peynefull, rychesse unprofitable, company annoyance, beauty turned to loth-somnes. Wyse men, not onely of the private estate, but also Emperors, Kinges, and other great princes, were therein ryght studyouse, in so muche as Juba the Kinge of Mauritania and Libya, found out the vertuous qualitees of the herbe called Euphorbium. Gentius, kinge of Illiria found the vertues of Gentian. Mithridates invented the famous medycyne againste poyson, called Mythridate. [Elyot then goes on to advocate the growing of herbs for medicinal purposes in this country so as to avoid their importation.] This well considered, I take it for no shame to studie that science, or to set foorth any bokes of the same, beyng thereto provoked by the moste noble maister Kyng Henrie viii, whose helth I hertily pray God as long to preserve, as God hath constitute mans life to continue. O roiall hert, full of very nobilitee. O noble breast, setting foorth vertuous doctrine and laudable studie. But yet one thing thyng muche greveth me, that though I have ever honoured the reverend colledge of approved phisicions, yet some of them have saied in derision that although I was pretily seen in hystories, yet beyng not lerned in physicke, I have put in my booke divers errors. But whan I wrate first

this boke, I was not all ignoraunt in physicke. For before that I was twentie yeres olde, a worshipfull physicion, and one of the moste renouned at that time in England, perceivng me by nature enclyned to knowlage, redde unto me the workes of Galene. And afterwards by mine own studie, I redde over in order the moste parte of the workes of Hippocrates, Galenus, Oribasius, Paulus Lelius, Alexander Trallian, Plinius, with Dioscorides . . . And although I have never been at Mountpellier, Padua or Salern, yet have I found some thyng in physicke, whereby I have taken no littell profite concernyng myne owne helth. Moreover I wote not why Physicions should be angrie with me, sens I wrote and did set forth the Castel of Helth for their commoditie, that the uncertayne tokens of urines and other excrementes should not deceive them, but that by the true informacion of the sicke man, by me instructed, they might be the more sure to prepare medicines convenient for the diseases. Also to the intent that men observyng a goode order in diete, and preventyng the great causes of sicknesse, they should be of these maladies the soner cured . . . Finally God is my judge, I write neyther for glorie, rewarde nor promocioun, onely I desyre men to deeme well mine intent, sens I dare assure them, that all that I have written in this boke, I have gathered of the moste principall writers in physicke, whiche shall be profitable unto the Reader, and nothyng noyouse to honest physicions, that dooe measure their studie with moderate livyng and Christen charitee.

The First Book deals with the "Conservacion of the Bodis of Man-kynde, within the limitation of Helth."

"Thynges naturall be vii in numbere. Elementes, Complexions, Humours, Membres, Powers, Operacions and Spiritres. These be necessarie to the beyng of helth." The different "complexions of man" are given in tabular

form. "Ayre becomes corrupted through the influence of sundrie starres, great standyng waters never refreshed, Carraine liyng long above ground, muche people in smal roume lyvyng uncleanly and sluttishly." Long tables are given of "Meates and drinckes makyng good juyce," those which "ingendre fleume," those "whiche do hurt the teath," and those "whiche do hurt the eies."

The Second Booke of Quantitie:

The quantitie of meat must be porcioned after the substance and qualite thereof, and accordyng to the complexion of him that eateth . . . Some meates do nourish but lyttel, havyng littel conformitie with bloudde in theyr qualities. The grosse meate ingendreth grosse bloude, but when wel dygested, it makyth the official membres more stronge, than fyne meates. In a cholerike stomache bief is better digested than a chickens leg. Meates that are clammie stoppeth the issue of vapours and urine, and ingendreth fleume and gravell . . . Biefe of Englande to Englishmen whiche are in healtie, bryngeth stronge nourishyng, but it maketh grosse bloud, and ingendreth melancholy . . . Above all kyndes of fleshe in nourishyng the body, Galene most commendeth porke, not beyng of an old swine. Yong pigges are not commended before that they be one moneth olde, for they do brede muche superfluous humours . . . The fleshe of hare and coney maketh grosse blud and stoppeth, but yet it provoketh a man to pysse.

Elyot then gives a summary of the good and the evil effects of the various kinds of meat. Our forefathers seem to have been of a very economical nature, and little of the carcase seems to have been thrown away, for our author states:

The stones and udder beyng well digested, do nourishe muche, but the stones are hotter with their moystnesse,

the udders colde and fleumatike, they both doe increase sede of generacion. The stoness of cockes maketh commendable nourishment.

Custome in feedyng is not to be contemptned or littell regarded. For these meates which a man hath been of long tyme accustomed, though they be not of substance commendable, yet do they somtyme lesse harme than better meates. Wherunto a man is not so fed. Also the meates and drinkes, whiche so muche delite him that he eateth, are to bee preferred before that whiche is better, but more unsavory. But the custome be so pernicious that it nedes must bee left, than wold it be withdrawn by littell and lyttel in time of helth, and not of sicknesse. For if it shuld be withdrawn in tym of sycknesse, Nature shuld sustayne treble detriment, first by the grieve induced by sicknesse, second by receivynge of medicines, thirdly by forbearynge the thyng wherein she delyteth.

There must have been a far larger variety of vegetables eaten in Elyot's time than in ours, for he discusses the merits and demerits of many fruits and vegetables to us unknown, except by name. Treating of "Byrdes" he says:

The flesh of al birdes is much lighter than the flesh of beastes in comparison, most specialli of those foules which trust most to their winges, and do brede in high countreys. The capon is above al other foules praised as it is easil digested. Avicen saith that if a hen be roasted in the bealy of a kyd or lambe, it wil be the better . . . The lunges or lyghtes of beastes are more easy to dygeste than the lyver and lesse nourysheth, but the nourishment that it maketh is fleumatyke. All be it the lunges of a foxe is medicinable for them that have sycknesse of the lunges.

Bred havynge muche branne, fylleth the bealie with excrementes and nourisheth littell or nothyng, but shortly descendeth from the stomake.

Of fish he remarks:

[The best is that] whiche swimmeth in a pure sea, and is tossed and lyft up with windes and sourges. The more calme that the water is, the worse is the fysh. They whiche are in muddy waters, do make muche flewme and ordure, taken in fennes and dyches be worste . . . Eggs wel poched are better than roasted. If they be fryed hard, they be of yl nourishment and do make stinkyng fumes in the stomacke and doe corrupt other meates with whom they be mingled.

Treating of water:

Drynke, that which is lightest in poise or weight is best, also that wherof cometh least skym or froth when it doth boil. Also that which will sonest be hot. Moreover deepe linnen clothes into sundrie waters and after lay them to drie, and that whiche is sonest drie, that water wherein it was deped is most subtil . . .

After a great surfet, specially taken with superfluous eating of bankettyng meates, cold water dronken is a general remedy. To them that are feble, olde, fleumatike or melancholy, it is not convenient.

God did ordein wyne for mankind, as a remedy against the incommodeities of age, that thereby they should seme to retourn unto youth, and forget hevynesse. Undoubtedly wine heateth and moisteth the bodie, whiche qualitees chiefly conserveth nature. The wyne whiche be pale or yelow and full of substance, they do increase bloud and nourishe the bodie, but for the more part olde men have nede of suche wyne, whiche do provoke urines. Blacke or deepe red wyne do harme to olde men, for as muche as they do stop the conduites of the splene, the lyver and the raynes." Quoting from Galen, he says that young men should drink but little wine for it makes them "prone to fury and to lechery and that parte of the soule whiche is called rationabile, it shall make troublous and dull.

Elyot has no great opinion of cider and says that anyone may note "in the countries where cyder is used for a common drinke, the menne and women have the colour of their vysage riveled, although that they be young."

Regarding the frequency of meals, he recommends that four hours should elapse between breakfast and dinner and six between dinner and supper:

Much abundance of drinke at meals drowneth the meate eaten and not onely letteth (i.e. hindereth) convenient concoction in the stomake, but also causeth it to passe faster than Nature requireth and so ingendreth reumes and crudenes in the veynes, debilittee and slippernesses of the stomake, and continual fluxe.

Elyot thinks that breakfast is necessary in this realm because:

Choler beyng cruent in the stomake sendeth up fumosities unto the brayne and causeth hed ach, and sometime becommeth adjust [burnt] and smouldreth in the stomake, wherby hapneth perillous sicknes and somtyme sodein deth. Therefore men and women not aged havying their stomakes clene, let them in Goddes name breake their faste.

He is of opinion that there is great danger in drinking much water. If the air is very warm however, "or by a pure choler, or eatyng of hotte spices, let hym drinke a littell julep or a littell smeall biere or ale, so that he drinke not a great glutte, but in a littell quantitee, let it still doune softly into his stomake, as he sitteth and than let hym not move sodeinly."

His ideas regarding the indigestibility of certain foods are quaint. For example he remarks:

Some drie meates eaten at one meale is the greatest enemie to helth that may be, and appaars helth, for some meates

beyng grosse and hard to digest, some fine and easy to digest, do require divers operacions of nature and divers temperature of the stomake, that is to say, muche heate and temperate heate, whiche maie not be together at one tyme. Therefore whan the fine meate is sufficiently boyled in the stomake, the grosse meate is rawe, so both juyces thone good and perfite, thother grosse and crude at one tyme digested, and sent into the veynes and body, nedes must helth decaie and sicknesse be ingendred. The nature of mankynde is beste content with thinges moste simple and unmixt, all thinges tendyng to unitee, wherin is the onely perfection . . . It maie seeme to all men that have reson, what abuse is here in this realme in the continuall gourmandise and daily fedying on sondrie meates at one meale, the spirite of gluttony, triumphyng among us in his gloriouse chariot, called welfare, drivyng us afore hym as his prisoners into his dungeon of surfet, where we are tormented with catarres, fevers, gouttes, frettyng of the guttes and finally cruelly put to deth by them, often tymes in youth or in the moste pleasant tyme of our lyfe, whan we wold moste gladly live. Alas howe long wyll men fantasie lawes and good ordinaunces and never determine them. Fantasie procedeth of witte, determination of wisdom, witte is the devisyng and speakyng, but wisdom is the performance which resteth onely in execucion.

"Of Slepe and Watche" Elyot writes:

First to a hole man, havying no debilittee of nature, and digestyng perfectly the meate that he eateth, a littell slepe is sufficient, but to them that have weake stomakes and doe digest slowly, slepe muste be muche longer, semblable temperance is required in youth and age . . . Immoderate slep maketh the bodie apt unto palseis, apoplexis, falling sicknes, rewmes, and impostumes. Immoderate watch maketh the bodie apt to con-

sumpcion. Thei that are hole must slepe first on the right side, because the meate may approche to the lyver, which is to the stomake, as fyre under the potte and by hym is digested. To them which have feeble digestion, it is goode to slepe prostrate on theyr bealies, or have their bare hand on their stomakes. Liyng upright on the backe, is to be utterly abhorred.

Concerning exercise and the most suitable time in which to take it, Elyot says:

The knowledge of this tyme is perceived by the colour of the urine, for that whiche resembleth unto clere water betokeneth that the juice whiche cometh from the stomake is crude in the veynes, that whiche is well coloured, not to high or base betokeneth that the second digestion is now perfect [i.e. when the food has been thoroughly digested and has passed into the circulation]. Where the colour is very high or red, the concoction is more than sufficient. When the colour of the urine is as it were gylte, than exercise should have his beginnyng.

Elyot has a chapter headed "Of Fricasies or Rubbynges precedyng exercise." He recommends the student however to "reade the boke of Galene of the preservacion of helth, called in Latine, De tuenda sanitate, translated moste truely and eloquently out of greeke into latin by Doctour Lynacre, late physicion of most woorthie memorie to our soveraigne lorde Kyng Henrie the eight."

The Third Book deals with "Replecion," which is a superfluous abundance of humours in the body. This may exist in "quantitee or qualitee."

[The first is] where all the humours fylleth and extendeth the receptories of the body as the stomake, the veynes and bowels, and is moste properly called

fulnesse, in greke, Plethora, in latine, Plenitudo. The other is where the body is infarced, either with choler, yellow or blacke, or with fleume or with watrie humors, and is properly called in greke, Cacochymia, in latine Vitiosus succus. Signes of replecion be these, losse of appetite, delite in nothyng, slouthfulnesse, dulnesse of the witte and sences, crampes in the body, stertyng of the membres.

Urine is the watrie substaunce of the bloud, lyke as whaye is of mylke, whiche out of the meate that is altered and concocte or boyled in the stomake, is strayned in the veynes called Nisaraice, which procedeth from the holowe parte of the lyver and sent by the veynes into the bladder. Of humours, some are more grose and colde, some are subtyll and hotte, and are called vapours.

Our author recommends the induction of vomiting in various affections, e.g. "as for hym that hath muche spyttell or his stomake wambleth and for hym that remeveth into sundrie places." From the color, consistence and smell of vomits he is enabled to draw certain prognostications. But "to enforce one to vomite, whiche can not, is very odious and to be abhorred."

"Of Scarifyng, called boxyng or cupping," Elyot writes:

It is not convenient to be let bloud oftentymes in the yere, because much of the vital spirite passeth forth into the bloud. Therefore the base partes of the body, as the legges, should be scarified whiche is the moste sure remedie, as well in conservyng helth, as in repayryng, therof, beyng decayed.

He was of the opinion that bleeding for piles was beneficial, for he says:

Somtyme superfluous bloud, by the puissaunce of nature, is by them expelled, and than be thei very convenient, for by them a man shall escape many great

sicknesses which be engendered of corrupted blood or of melancholy. Semblably, if thei be hastily stopped from the course thei have been used to, then dropsies, consumption madnesse, francies and divers diseases of the head develope.

In "Affectes of the Mynde" patients "not onely require the helpe of physicke corporale, but also the counsayle of a man wise and wel lerned in moral philosophy:"

At this present tyme in the realme of Englande, there is not any one more annoyance to the helth of mans bodie than distillacions from the head called reumes. Distillacion is a droppying downe of a liquide matter out of the head, and fallng either into the mouthe, or into the nosethrylles or into the eies, and sometye into the chekes and eares. If it fall into the throte it causeth hoarsenesse, and later it makyth the voyce littell. Sometyes it doth exulcerate the lunges.

If it "falls into the stomake" our author recommends wormwood, or hierapicra.

Other troubles arise from distillacions," as:

Whirleynges, called in latin Vertigines, stinkyng of the nose called pollipos, etc. . . . This dare I affirm, that the reumes, which of late tyme have been more frequent than they were wont to be xl yeres passed, have happened of none occasion more than of bankettyng after supper, and drinkyng muche, especially wine, a littel afore slepe.

By what tokens one may knowe whether the Stomake and head be hotte or colde . . . In hotte distillacions the head is very hotte in feelyng, the reume in the mouthe is thinne and warme, the tongue or cheekes within blistered, the face redder . . .

Many articles of materia medica Elyot prescribes for this condition; but chiefly he must avoid hot articles

of food or exposure to heat. Those who suffer from the "colde reume," as evidenced by coldness of the head with paleness of the face, must avoid cold things and especially must avoid "Northern wyndes, the moonshyne by nighte, washyng in colde water and to be long bareheaded."

The writer says that he will not speak much of sicknesses common to particular times of the year or to different ages because:

It were very perillous to divulgate that noble scyence to common people not lerned in liberall sciences and philosophie, which be required to be sufficiently in a Physicion. And moreover many bookes of Hippocrates and Galene ought to be radde, before that one dooe take upon hym the generall cure of mennes bodies.

In tabular form Elyot gives a list of ailments under different headings, e.g., "The Braine sicke," "The Heart Sicke," "The Lyver sicke," etc. His notes are in many cases accurate and evidence good powers of observation, thus:

At the first pyssing all urines well nigh do appere thinne [clear] as long as thei abide warme, for natul heate, duryng the time that it prevaieth, suf-freth not that the liquor to congele or be thicke for any occasion, but after that heate is goone, some urynes shortly, some a longer tyme after, waxe thicke. Likewise some tyme, some are pyssed thicker, and after waxe clere, some remaine still as thei were made, some bee metely thicke, as they were troubled, some very thicke and grosse. They that waxe clere, sone doe gather that whiche is thicke into the bottome of the urinall. Some remaine troubled, the grossenes notwithstanding gathered in the bottom.

Thus make I an end of this Treatise, desiryng them that shall take profite

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therby, to defend it against enviouſe diſdayne, on whom I have ſet the Adventure, for the love that I beare to my countrey, requirynge all honeſt phyſicians to remembre, that the intent of my labour was, that men and women readyng this worke and obſervynge the counſayles therein, ſhould adapte therby their bodies, to receive more ſure remedie by the medicines prepared by good phyſicians in dangerous ſickneſſes, that keepynge good diete, and inſourmyng diligently the ſame phyſicians of the maner of their affectes, paſſions and ſenſible tokens. And ſo ſhall the noble and moſte neceſſarie ſcience of phyſicke, with the miniſters therof, eſcape the ſclander, whiche thei have of long tyme ſuſteyned, and accordynge to the precept of the wyſe man, be worthily honoured, for as muche as the higheſt God did create the phyſician for mans neceſſitee. And of the earth created medicine, and the wyſe man ſhall not abhorre it. Thus fare ye well gentill readers, and forget me not with

your good reporte, and praie to God that I be never worſe occupied. Finis.

So Elyot finiſhes his book. Reading the extracts which I have given, many may think the work crude and ill-informed. One muſt remember however the time at which it was written, and compare it with the medical books which were publiſhed then. If we do ſo, it will be found that Elyot's "Caſtel" comes out well in the trial. In it there are none of the ridiculous and often repulſive preſcriptions ſo often given by practitioners of that age, and his counſels for the preſervation of health ſtand comparison with many of thoſe of the preſent time.

A ſurvey of Sir Thomas Elyot's life, his accompliſhments and chiefly the extent of his learning, place him, in my opinion, in the forefront of thoſe who have endeavoured to help their fellow men.



SKETCHES FROM THE LIFE OF ALBRECHT VON GRAEFE (1828-1870)*

By FRANCIS HEED ADLER, M.D.

PHILADELPHIA

THE progress of science is not a continuous, uninterrupted, even march; it is rather a succession of sudden incoordinated movements, coming unexpectedly and proceeding in unpredicted directions. Between startling periods of advance are strangely quiescent intervals.

In the history of ophthalmology the eighteenth century was one of these relatively stagnant periods. The century preceding had been full of anatomical discoveries related to the eye and crowned by the work of Johannes Kepler¹⁶ on physiologic optics. From the time of Kepler in the seventeenth century until Helmholtz¹¹ in the nineteenth century there was little advance in optics, either physical or physiological. The corpuscular theory of light proposed by Sir Isaac Newton²⁰ in the latter part of the seventeenth century held sway until Thomas Young²⁴ revived and further developed the wave theory in 1802. Scheiner,²¹ Robert Hooke,¹⁴ and Mariotte constructed the scientific foundation of ophthalmology in the seventeenth century which developed so brilliantly in the nineteenth. But the eighteenth century was relatively barren. It was productive of but one striking advance, the operation for cataract. Ophthalmology seemed to slow down as though gathering force for the tremendous stride which was to come early in the next century.

In order to appreciate the genius of

Albrecht von Graefe it is best to get some idea of the state of ophthalmology during this period, that is, prior to 1828, the year of his birth. There were no professors of ophthalmology in either Germany or France until 1825. In France, it is true, there had been a chair of ophthalmology established in the College of St. Côme, its first incumbent being Dehais-Gendion. Following the French Revolution, however, all the universities were abolished by the Convention. In Vienna Joseph Barth held the first chair in 1773; but ophthalmology in Germany was not recognized as worthy of a full professorate at this time. The situation in Germany was considerably worse. Even Von Graefe was never a full professor in the Berlin University. Not until 1873 was Jacobson appointed Professor of Ophthalmology in the University of Konigsberg. In June of the same year Schweigger received the appointment at Berlin. There were no ophthalmic hospitals until 1805 when the Royal London Ophthalmic Hospital opened its doors. The first ophthalmic journal was begun in 1801, the *Ophthalmologische Bibliothek* founded by Himly and Schmidt; but it lived only six years. It can truthfully be said, therefore, that prior to the nineteenth century chairs of ophthalmology, ophthalmic hospitals and journals did not exist.

Patients with eye diseases were

* Read before the Section on Medical History of the College of Physicians of Philadelphia, Nov. 20, 1928.

treated by the general surgeon, with what little skill, and perhaps less inclination, we may imagine. The inflammatory diseases of the anterior segment of the eye were treated by antiphlogistics, and often worse remedies. No one knew of bacteria as the cause of disease. There was no antiseptis, much less asepsis, and the massive two-volume textbook of Joseph Beer² which appeared in 1813 and which was the authority on the whole of ophthalmology, explained the etiology of ocular inflammation by the influence of the surrounding atmosphere. No experienced surgeon, he states, would operate on a cataract when the weather was stormy or even threatening rain. In this same textbook Beer gives an excellent picture of gonorrheal ophthalmia in the new born but attributes the disease to contaminated air, or to exposure to light and the chill experienced by the child at the christening. Beer recommended as treatment keeping the eyes cleansed and instilling tincture of opium. It was forty years later that Von Graefe introduced the use of silver nitrate in this condition. The use of extracts of belladonna for producing mydriasis was not begun until 1801 by Himly; and the myotics were unheard of. There were no means of estimating quantitatively a patient's visual acuity, test types being first invented by K  chler¹⁷ in 1843. Jaeger published his set of standard types in 1854. Glasses were purchased from street vendors for the most part, and these consisted only of spherical lenses; cylinders for the correction of astigmatism were not employed until the middle of the nineteenth century. Benjamin Franklin⁵ had invented bifocals, and by this time they were no doubt becoming popular.

Not until early in the nineteenth century, due to the influence of Arlt, was the prescribing of glasses undertaken by ophthalmologists. Many eye diseases were pronounced entirely hopeless, chief among which was glaucoma. Of the eye operations there were few successful. Enucleation had, of course, been done for many years. Daviel³ had reported the success of his operation for cataract and the bitter struggle between the advocates of the old method and those of the new had commenced.

The operations for strabismus began with Dieffenbach's⁴ tenotomy in 1839, and two years later Guerin¹⁰ described a rather bad advancement operation. No one had yet seen the interior of a living human eye. Mery, in 1704, had, as someone unwittingly reported, accidentally held a cat under water, and beheld the beauties of this animal's fundus through the dilated pupil, but Helmholtz in 1828 was still in knee breeches. It is not too great an exaggeration to say that the plight of those who were unfortunate enough to have an eye disease or a troublesome refractive error prior to 1828 was rather deplorable. The medical profession held out a somewhat weak helping hand to those afflicted.

Now let us pass by twenty-four years and read a letter from a very young man still a stranger to the world written to a man seven years his senior who had suddenly become famous:

Esteemed Professor,

You will pardon me for taking the liberty of addressing you, an utter stranger, and requesting a favor concerning a subject which interests me greatly. Last summer I learned through Professor Br  cke in Vienna that you have succeeded in constructing an instru-

ment for examining the retina in the living eye; I even had the pleasure of hearing some of the details by means of which you accomplished this. Professor Brücke was the more willing to communicate these to me since we frequently talked over the possibility of such an instrument and he had previously shown me a scheme of his which had miscarried because of the lack of suitable illumination. Brücke expected to obtain the catoptric and dioptric effects from his instrument by means of a concave glass placed at an oblique angle over the observed eye.

The news of your successful accomplishment was, therefore, the more welcome to us, and I awaited the publication with impatience until a few days ago when I was fortunate to find it waiting for me on my table on my return to Berlin after a long journey.

To the study of this article I am not only indebted for an exact understanding of the instrument but also for the explanation of other questions in optics which were formerly quite closed to me. I am, therefore, going to ask you if you will kindly request your optician to send one or two of your finished ophthalmoscopes as soon as possible to my address in Berlin.

Albrecht von Graefe wrote this letter⁷ to Helmholtz about 1852 shortly after his return from a three-year journey to the medical centers of Europe. He was but twenty-four years old. For the previous three years he had had the best instruction in ophthalmology which was then available, and he had just returned to Berlin to begin a career which was short but so meteoric that the whole ophthalmic world now pays grateful tribute to his memory, one hundred years after his birth. This letter shows wherein lay part of his genius; he recognized the enormous value to ophthalmology of such an invention,

and lost no time in perfecting himself in its use.

He was born in 1828 in Berlin, the son of Karl Ferdinand von Graefe, the first Director of the Surgical Clinique of the University, who incidentally was a very able surgeon but had the misfortune of being succeeded by no other than Dieffenbach, who was such a genius that the elder von Graefe was quickly forgotten. Von Graefe's family was relatively wealthy and he received the best education available. He had two brothers and two sisters, and as the father died while Albrecht was only twelve the duties of bringing up this rather large family fell on the able shoulders of the mother. Albrecht was sent away to one of the French schools, where his industry soon marked him out. By his fifteenth year he had finished this school and since he was too young to enter the University he spent a year studying mathematics and philosophy and carrying on studies in chemistry in the private laboratory of Professor Rommelsberg. If we can believe the historians of that period he was one of those precocious youths who astonish their teachers. In 1843 he entered the University, having among his teachers Johannes Müller, Schönlein, Romberg, Dieffenbach and Virchow. By the time he was nineteen he received his doctor's degree and journeyed to Prague where he came under the instruction of Ferdinand Arlt. This visit decided him to become an ophthalmologist. He now travelled from city to city wherever the abundance of clinical material or the special skill of some surgeon made it worth his while to stop and learn. In this way he spent the winter of 1848 in Paris in the clinics of Sichel and Desmarres and

in the physiological laboratory of Claude Bernard where he began his work on ocular movements. Finally he travelled to Vienna in 1849 where Jaeger, who had been a great friend of his father's, welcomed him heartily. In August, 1851 he visited London and it was there he met Donders. There have been few finer friendships in the history of medicine than that of Von Graefe, Donders and Bowman. Von Graefe was a clinician from the start, Donders a physiologist and Bowman an anatomist. It requires no great stretch of the imagination to see the influence which these three men exerted on each other. Each started life with a slightly different viewpoint, but these were finally converged to a common interest, and to this association each brought with him the advantages of special knowledge in his own field.

It was in 1851 that Graefe visited London. Years afterwards (to be exact, in 1886), Donders was chosen to present the first Graefe medal in honour of his lifelong friend who was now dead. In his speech⁶ at this presentation he recalled his first meeting with von Graefe as follows:

I had been enjoying the company of Jaeger for several days, when one morning in Guthrie's Clinic a young man in full Alpine costume burst in (he had only arrived in London a few hours before) and flew into von Jaeger's arms. With the words, "Here, you two belong together," the latter literally threw him into my arms. He was not wrong. From early morning after we gathered up a hasty breakfast in Oxford Street, and followed the footsteps of the workmen on our way to Moorfields Hospital until late in the evening when we departed from the hospitable home of our friend William Bowman we remained together, inseparable in our search of a common

goal. Von Graefe led me in practical matters in which I had as yet scarcely dived and I in return could help him in many things from the physiologic aspect. There lay for both of us in this mutual and complementary relationship a great stimulus. Those days in which Von Graefe gradually displayed the whole fineness of his nature belong to the loveliest recollections of my life. When I left him after several weeks he had become like a young brother whom I admired and loved.

Leaving London von Graefe hastened back to open a clinic in the city of his birth, modeled after those he had seen in France. At this time there were no free clinics in Berlin for strictly eye patients.

He rented the second story of a small house in Behrens Street, and moved two tables into the front room. On one of these were two dark bottles containing different strength solutions of silver nitrate, and a flask of lead acetate, and one of tincture opium. Silver nitrate stick and copper sulfate lay close by. In one corner stood a cabinet with Luer eye instruments. Two chairs were so arranged by the tables that one on which the patient sat was well illuminated from the window, while von Graefe sat on the other with his back to the light. Across the room was an antique desk on which lay prescription pads. A small corridor and a small waiting room completed the Polyclinic.¹⁹

Two very simple rooms were rented from a tailor in Johannes Street, furnished with beds ready to receive the operated cases. This was the beginning of the famous Graefe Clinic to which ten years later most every section of the inhabited world each year sent its quota of patients. It was a humble beginning. Graefe was unknown in Berlin. His three years

of travel had made him friends abroad but his abilities were still hidden under a bushel as far as his Berlin colleagues were concerned. We may be shocked to learn that there now appeared in all the Berlin newspapers the following advertisement, repeated daily. "Dr. Albrecht von Graefe, in Behrens Street. Eye diseases treated free for the poor."

At first only the impecunious applied, and the story of his first operation is tragic but rather amusing. A cataract extraction was performed on an old inmate of a poorhouse one morning and at the same time an iridectomy was done on an organ grinder who had an old adherent leucoma, the result of ophthalmia neonatorum. During the second night after the operation the poor old inmate of the home had delirium tremens, tore off his bandages and crawling out of bed pounced on the organ grinder and began wreaking his vengeance on him. In spite of large doses of opium the cataract patient died the following evening but the organ grinder had an uneventful convalescence, and in spite of his pummeling departed with an artificial pupil which permitted him for the first time in his life to go about the streets without being led.

Two months later the clinic books showed over 230 patients, and ten months later, while still only twenty-five years of age, he had over 1900 patients. The clinic and hospital expanded now as if by magic. A few years later still the books recorded the astounding yearly total of over 10,000.

Von Graefe had now begun his private practice, clinical teaching and research. His energy must have been

unlimited, and it is said he usually worked well into the night. Gradually there gathered around him men who came to watch his methods and to learn. In the fall of 1857 he and a few of his friends gathered at Heidelberg to talk over the progress of ophthalmology. This formed the beginning of the Deutsches Ophthalmologisches Gesellschaft, the oldest local ophthalmological society in existence.¹ Strangely enough the very first ophthalmological society founded was of international scope and was held in Brussels in the same year. In 1863 the Gesellschaft was definitely established, and by the following year there were eighty members from all over the continent and abroad. From the very beginning von Graefe, the founder, was the soul of the Gesellschaft and continued so until his untimely death.

In 1854 he founded the world-famous *Archiv für Ophthalmologie* and in the first volume presented to the scientific world his classical work on the action of the oblique muscles. This paper was the outcome of work begun in the physiological laboratories of Claude Bernard, stimulated later by suggestions from his friend Donders and by his own careful observations of cases of ocular muscle paralysis. Following this came a paper on diphtheria of the conjunctiva, which he recognized for the first time as a clinical entity; the Klebs-Loeffler bacillus was not discovered until 1886. There is scarcely any phase of ophthalmology which he did not eventually touch, and each time a paper appeared it widened the circle of existing knowledge and opened up new fields for research. It is impossible to calculate the impetus he gave to

the development of ophthalmology. If someone were to ask pertinently what one great thing he did which brought him fame, an answer would be difficult. One may point to his best known contribution, that is, the operation of iridectomy in the treatment of glaucoma. This operation, without modification, is still after seventy-two years generally considered the best operative treatment for acute glaucoma. The knife which he devised for cataract extraction is used today by almost 100 per cent of the world's ophthalmic surgeons. He was the first to describe the cupping of the optic papilla in glaucoma, and to attribute this and the other changes in glaucoma to the rise of intraocular pressure. He was the first to describe embolism of the central artery, and to predict the condition of the cerebral circulation from the ophthalmoscopic picture of the retinal blood vessels. He pointed out the relation of choked disc to intracranial disease and attributed the swelling of the nerve head to the stasis of venous blood caused by the increased intracranial pressure blocking the cavernous sinus. The list of his contributions is too long to attempt.^{15,12,13,8,13}

Once more the impetus to progress had come, and through von Graefe's untiring efforts the advance was swift and far-reaching. But the expenditure of energy had been too great for one man to stand; in the fall of 1861 an attack of pleurisy gave the first warning. He recovered from this, married, and continued to work. From time to time his symptoms became so aggravated that he had to take periods of rest and quiet in the Alps which were so dear to him. His nervous energy kept him on his feet,

but steadily he grew weaker. His colleagues would frequently see him quietly leave the operating room to find relief from his symptoms in narcotics, and then return to proceed undisturbed.

By 1869 his cough and hemoptysis had almost incapacitated him. He could not attend the meeting of the Gesellschaft at Heidelberg, which almost broke his heart; and when Donders called on him to tell him about the meeting and to sympathize with him von Graefe, with his cheerful, kindly smile, quoted the words of Goethe, "One cannot learn too soon how really unessential he is in the world." Disaster followed quickly. In that summer he lost a new-born child, and shortly thereafter his wife's life was threatened by an embolic pneumonia. His own strength was rapidly going, but he continued to work as long as any energy was left, as is indicated by one of his letters written on the 23rd of May, 1870:

My health continues to be pretty miserable. I have no fever now, but am frightfully exhausted. I manage to spend about twelve hours daily out of bed, and of these I can devote four to my clinic. I have begun my lectures again (perhaps more for my profit than that of my audience). Of course as a sensible man and a physician I have no exaggerated hopes of recovery, but it seems best to me to keep busy up to the last moment and avoid useless brooding.

On the 20th of July, 1870 the last moment arrived, and he died during the night. He was only forty-two.

How little ophthalmology seems to have advanced in many of its departments since von Graefe left it—therein lies the measure of greatness of any man.

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HISTORY OF HAITIAN MEDICINE

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INTRODUCTION

IN order to view the history of Haitian medicine with any sort of perspective it is quite necessary to consider first certain factors which have had a profound influence on that history.

The country itself, its geography and climate; the inhabitants with their modes of living, their culture, their racial susceptibilities and immunities to the various diseases; the political history with its effects upon the prosperity and well-being of the people and upon the opportunities for education and for development in the arts and sciences—all these factors must be kept in mind if we are to form a judgment upon the medical history of a country.

If the prevalence of certain diseases in a country can be included in the scope of its medical history, then the medical history has had in Haiti as great an effect upon the political history as the political has had upon the medical. Just one instance of this is the fact that had yellow fever not been present during the War of Independence, the political changes which occurred in 1804 would either not have occurred at all or would have been delayed for many years. General Le Clerc died of yellow fever, and his ranks were so depleted and demoralized by the disease that the French army in Haiti was virtually defeated by yellow fever, and would have been eventually defeated by it had never a shot been fired on either side.

In a very great many respects,

Haiti stands absolutely unique among the nations and countries of the world. With the exception of Liberia, it is the only sovereign state under negro rule. Although only about the size of the state of New Jersey one can find by going to different parts of the island almost any kind of climate or scenery desired. From the lower altitude areas with their tropical heat and gorgeous verdure, or their arid cactus lands (according to the rainfall of the section) one may ascend up through the central plains about Hinche which readily remind the traveller of parts of Wyoming or Montana; and then, still higher, in many of the mountainous regions above 5000 feet, the pine forests and low temperatures could quite possibly make one think of summer days spent in the woods of Alaska or Labrador!

Nowhere in the western hemisphere can one find human life existing in a more primitive state than in many of the rural localities of Haiti. The general mass of the people are extremely poor, illiterate, underfed, suspicious, superstitious, and sick, and for over a hundred years until 1915 had little chance of contact with what culture there was to be found in the larger towns.

Another respect in which Haiti stands out so prominently is in the annals of preventive medicine and state medicine. Nowhere in history have such tremendous changes and spectacular achievements been brought about in such a short time. In the short space of ten years an

unspeakable hotbed of diseases, ranking second to none in the world in downright rottenness, has been transformed into a relatively clean and healthful land which now compares favorably in sanitation with any place in the tropics; and a mass of three million people, sick, suffering beyond all power of words to describe, crippled, and weakened from the ravages of a host of diseases (for the most part preventable and curable), pitifully helpless and hopelessly resigned to their lot, have, in the mass, in a period of five years not only travelled far on the road to recovery, but have also in a large measure succeeded in eradicating these diseases from their land.

Haiti has served as a laboratory of applied preventive medicine and state medicine. The possibilities in these fields have been demonstrated there in a manner that is nothing short of miraculous. It has also served as a sociological laboratory. There race problems can be studied and solutions tried as nowhere else in the world. The negro has shown there astonishing capabilities in many fields of human endeavor, not the least of which is in medicine. Perhaps the white man has shown him the roads, but he has followed them in a much more admirable fashion than we had expected. Whether he will continue to follow them after the American occupation has been withdrawn remains to be seen.

Almost every one of the great rural populace is afflicted with malaria, yaws, and intestinal parasites, for which until very recent years they could obtain no medical relief.

The only pretense, even, in the way of treatment for their ills, many of which were African importations, were the witchery and herb concoctions

also of African origin. In French colonial days many French doctors, some of whom were in the service of the French emperor, attended the sick slaves as well as the whites. Slaves were valuable property and owners were willing to pay for services that might restore the slaves to working condition, or for measures that would prevent the spread of contagious diseases among them. Since the independence in 1804, in the larger seaport towns, several capable Haitian doctors (and in later years a few German doctors) have resided and practiced, but these men were strictly for a paying clientele, which meant the very few of the elite, and generally speaking, these were the town whites and near whites. These medical men were certainly not concerned with public health measures in the absence of funds or any other sort of governmental encouragement or support. They were further handicapped in their work by African witch medicine traditions which ramified into the homes of many of the rich and educated town natives and often even into the presidential and royal palaces.

Considering these conditions it little becomes us today to look with any scorn at the medical situation we found in Haiti in 1915. We may here remind ourselves that in the United States where every opportunity for education and every encouragement for scientific development exists, we find flourishing such institutions as our chiropractic and numerous other cults, all of which cure exactly the same conditions by precisely the same mechanisms that hold for the practice of the Haitian voodoo healer.

If the Haitian peasants were reluctant in the first years of American

occupation to accept what the newly formed Public Health Service had to offer, the wonder of it really is that they took it as well as they did. As soon as the Haitian had half a chance to see the value of modern medicine and public health measures, he clamored for it in a way that rather puts us to shame.

But lest we get ahead of our story, let us state here that Haitian medicine falls logically into three principal periods; namely, the French colonial period during the 17th and 18th centuries, the independent period from 1804 to 1915, and the period of American occupation since 1915.

THE FRENCH COLONIAL PERIOD

Although there was nothing in the way of medical activities prior to the French rule, other things were happening which were later to influence the medical history. With the landing of Columbus at Mole St. Nicolas, December 6, 1492, began the period of exploitation by the Spanish. Within sixty years from that time the Carib Indians had disappeared. Several causes contributed to bring about this disappearance. Many of the Indians were worked to death; many were murdered outright; but the chief cause was smallpox. A virulent epidemic occurred about 1500 and this is said to have killed some 200,000 Indians. Accounts of this epidemic are given by Frédéric Roux,¹ and by Frère Archange² who has written also of several later smallpox epidemics in Haiti. Smallpox is one of the few Haitian scourges which was not introduced there from Africa. It is readily understood how this new disease could decimate the Indians, their immunity to it then being nil.

Stitt³ has written that:

Of the exanthemata the one which undoubtedly did more to decimate the aborigines of the New World than all other diseases and warfare combined was smallpox. All evidence attests the introduction of this disease by the whites. The stories we read of the wiping out of whole populations in Mexico and Central America following the Spanish Conquest are connected with smallpox rather than warfare.

This period of search for gold by the Spaniards did not permit any time or thought for the health and comfort of the inhabitants. As the Caribs were rapidly disappearing, and were poorly adapted to the purposes of the Spaniards, African slave importation was soon started.

Under the Spanish governor, Ovando, the first African slaves arrived in 1503. The Spaniards at first looked upon the slave importations as a rather unwise policy. The slaves did not take kindly to their new life and were accused by the Spaniards of instigating revolts among the Indians. There were sporadic revolts among the negroes, including one on the plantation of Diego Columbus, son of Christopher. But by 1520 the slave trade was progressing in earnest, and by 1790 importations and increases by birth had brought the slave population to a half million. It then outnumbered the whites by 16 to 1.

The slaves came from a wide area of Africa. According to Saint-Méry,⁴ they were supplied by African towns all the way from the mouth of the Senegal at 17° north on the West African coast, around the Cape of Good Hope and up the Mozambique at 10° south on the east coast. Not only the coast line but great sections of the interior also furnished them.

The slave trade not only brought many new diseases to Haiti, but brought as well the Voodoo methods of magic medicine to deal with them. In this connection Butler⁵ states:

To us who are familiar with the deadly diseases which are found in this immense area of Africa, the wonder is the West Indies and the two Americas came out of the slave trade as well as they did in the matter of disease importations.

It is reasonable to think that during 292 years of slave trade between 1512 and 1804 every type of disease that the continent of Africa might boast of had been brought to Haiti. It is sound medicine also to reason that all African diseases except those requiring vectors not present in Haiti have prospered here. This statement also applies to African types of religious worship (Voodooism). In 1804, accordingly, the Nosology of Haiti, had there been such, would have included all of the diseases that 312 years of European intercourse could contribute, together with what Africa could add during 292 years of slave trade. These two are, of course, to be supplemented by such strictly American contributions as the Caribs could make before they were exterminated.

It seems certain from the writings of Sydenham⁶ that yaws came in the slave ships from Africa. His writings were based on actual observations connected with the slave trade. Yaws was then the chief cause of damage to the slave trade, just as now it probably causes more economic loss in Haiti than all the other diseases there combined.

Whether yellow fever was an African importation is doubtful but it is quite possible. According to Hirsch⁷ the records regarding yellow fever during the early days of European intercourse with the Western Hemisphere are so defective, and there

was such a confounding of yellow fever with bilious remittent malarial fever and black water fever that there can not be any enlightening of the obscurity into which the history of this disease has fallen.

The French settlement of the island began with the arrival of the buccaneers about 1625, and in 1641 LeVasseur was sent by the French government to expel the British and to direct the affairs of the colony.

It is difficult to find any records of medical activities or observations during the next hundred years. We know that the country was being rapidly developed, was prospering, and was earning its name of "The Flower of the Antilles." The great power of Louis XIV made for progress and peace in all the French colonies, and in Haiti the agricultural and commercial development was due in great part to the efficiency of the Colonial governors, Bertrand d'Ogeron and his successors, de Pouansey and Du Casse, who had been well chosen to represent the king in this, the richest of French colonies.

The multiplication of slaves was adding to the wealth of the colony. The conditions under which these lived must have resulted in a high morbidity from yaws and malaria.

Judging from the writings of Pouppé-Desportes,⁸ tetanus was becoming a frequent cause of death, especially among the new born of the slaves, and it was recognized then (1730) that this was due in some way to umbilical infections, or at least that it was in some way associated with a pathology of the cord. Joly Ducoeur⁹ thought that tetanus (or "sick jaw," as he also called it) in the new born resulted from "impressions of the air" and advised keeping

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the babies in tightly closed rooms until they were nine days old. He wrote: "If one exposes them to the air at the moment of birth they get a convulsion of the jaws which prevents them from nursing and from which they die." He gives a classical description of tetanus in adults, and believed that adults contracted it either from too much air, or from being exposed to smoke. He was in decided disagreement with his confreres who thought that the disease in the new born was caused by tying the cord too tightly, and argued that the white babies who were not neglected in regard to care of the cord also frequently had tetanus.

Tetanus has evidently always been a very common disease in Haiti and even today it is not only common among adults but also among the new born.

Under Louis XIV colonial affairs continued to prosper, and in 1697 the treaty of Ryswick ceded to France the Spanish (eastern) part of the island, thus adding greatly to the wealth and importance of the colony.

About 1700, military hospitals were constructed at Cape Haitien, Port au Prince and Aux Cayes, and many doctors in the service of the King were practicing in the larger towns and speculating upon the many new and bizarre diseases encountered.

On the poorer plantations and those further removed from the towns, the slaves were treated for the most part by the ministrations of the witch doctors, just as the diseases of their descendants continued to be treated until some time after 1915 and to a certain extent even at present.

On the richer plantations there was usually a special building which served as a hospital for the sick slaves. The

custom was to put a negress in charge of these sick quarters. She had to be well qualified for the position. She must have sufficient intelligence to follow the instructions of the surgeon and possess the firmness to make the patients follow the regime prescribed. Those not very sick were often chained to their beds lest their illness be too much of a holiday for them. When they were suspected of feigning illness in order to avoid working, the diet and drugs given them were such as to make them soon prefer to return to the fields.

Those with yaws were never admitted to these small plantation sick quarters, but were either treated in their own huts or in a special yaws building well removed from the other buildings. Increased fees were charged the owners for treatment of yaws cases.

The great prevalence of intestinal worms was well recognized in the early part of the 18th century, not only by the local physicians in Haiti, but by slave owners and the slaves themselves. *Ascaris* was the principal worm known at that time; the hookworm must have escaped observation on account of its size. A large variety of anthelmintics was used but these were mostly made from native plants which are still used today and which we know are of very little value.

Chevalier,¹⁰ writing in 1752, observed many cases of guinea worm (known then as *ver de guinée*, *dracunculus perearum* and *vena medinensis*), gave accurate descriptions of it, and advised the same method of extraction (that of rolling it up slowly on a stick) that is used today in Africa. The cases seen by Chevalier were probably recent arrivals from Africa, as that worm is not found in Haiti today,

life outside the human host being evidently unsuitable for it there.

On many plantations it was the custom to put all the young slave children under the charge of one negress, who bathed them daily, mustered them for meals and inspections, made reports on worm infestations among them and possibly administered the native anthelmintics. Her work also included the removal of chigres from the children's feet. Chigres, known in Haiti as "chique" was probably a strictly new-world parasite, since the word comes from the Carib name "Chego."

Chevalier must have devoted considerable time to the observation of and pondering on the diseases he found in Haiti in the early years of the 18th century. He wrote a series of letters to his confrere, M. de Jean, Regent Doctor of the faculty of medicine at the University of Paris. These letters were published in a small book form in 1752.¹⁰

Not having the Wassermann and Kahn reaction nor the dark field, he described many conditions which sound quite clearly to us today as late yaws manifestations, but which he did not recognize as such. His "ankyloses and exostoses" were doubtless mostly late yaws conditions, and it seems most probable that many of his cases of leprosy and scrofula were yaws. The very fact that he did not recognize that yaws was the great Haitian disease makes one suspect that he was misdiagnosing all but the early and typical cases.

One does not know where to place his "maladie de Siam" unless it was a disease that no longer exists in Haiti. He tells us that this strange disease appeared at Martinique after the arrival of a ship from Siam, and that

it then spread from Martinique to Haiti. He says that few of the new white arrivals escaped the disease. This would suggest dengue, but he speaks of a high mortality, which would exclude dengue and make malignant malaria more probable. Epistaxis was a common symptom of the disease, as were also convulsions, delirium, coma, and lethargy. The most logical explanation would seem to be that he was including several conditions under this name, probably dengue, malaria and typhoid, those making early recoveries being dengue and those showing lethargy and fever for several weeks and then recovering being either typhoid or malaria. He noted accurately that enlargements of the spleen and liver were more common among whites than negroes. Wilson¹¹ and Clark¹² have shown in recent malarial surveys that splenic enlargement occurs relatively very infrequently in Haitian negroes with malaria.

Chevalier¹⁰ found leprosy and scrofula to be equally distributed between whites and blacks and believed that these two diseases were possibly the result of "smallpox passed through many generations from father to son."

What seems most extraordinary and puzzling of all medical practice in those days is that so little cinchona was used. The medical writers of all periods of the 18th century in Haiti mention it but have little to say about it and apparently did not realize its virtues over all the other drugs at their command in the treatment of malaria. Nearly all the case reports in cases where it was used show its decided value, but for some reason they usually preferred a host of other drugs which we know have no therapeutic merit in malaria. Desperrières¹³

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has recorded many case histories of what were apparently malaria, but only in one of them he mentions cinchona: "This patient I purged with epsom salts and quinquina, which always produced good results." It must be remembered here that quinine was not put on the market until about 1820. These men in the 18th century would doubtless have recognized its valuable properties and that it was superior to cinchona if it had been available. The tendency then was always to use a great variety of drugs, and when cinchona was used along with other drugs in the same case, its particular value was of course obscured.

Any sort of intelligent therapeutics or progress in that field of medicine was greatly obstructed by the "doctrine of solidism." For example, Joly Ducoeur's treatment for yaws was "sudorific drinks and dry food." This system of treatment for yaws was evidently based upon the "doctrine of solidism" which was widely accepted by French physicians in the 18th century, and which Rulx Léon¹⁴ writes "was largely used to throw light upon the diseases of tropical countries."

Dazille,¹⁵ who was a major in the medical corps of the army of Louis XVI, and who served in Haiti, wrote in explanation of the "doctrine of solidism:"

Knowledge of the situation of a country and its products is closely associated with that of the diseases of its inhabitants; those of a low swampy country have almost always a "loose" affection—from a stasis of the fluids, different kinds of fevers, obstructions, and all the chronic diseases.

On the contrary, the inhabitants of dry arid places, burned by the sun, show

the opposite diseases, arising from a thickening of the blood and the dryness and too great action of solids.

Exclusive of the diversity of form, size and color of plants, I think that according to their constituents and properties they can be reduced into two classes—the "moving" remedies and "still" remedies.

In acute diseases where it is necessary to loosen and undo, baths, blood letting, and mild sweet drinks would be the "still" remedies to be employed as long as the violence of the inflammatory symptoms persist.

On the other hand, in chronic diseases, where it is necessary to restore the tone of the fibres by the most active remedies, tonics and the strongest evacuants would be the "moving" medicines indicated.

Pouppé-Desportes,³ also in the service of the king in Haiti, expressed his conception of the doctrine in terms which seem equally as ridiculous and difficult to comprehend as those of Dazille:

Aside from the quality of the air, which is such as the ancients have described, putrefaction, according to physical principles, is brought about and maintained by the difference in food, coarser and less succulent than European food, forming a chyle and thick blood, coating the intestines with sticky material, retarding secretions, and finally causing engorgements and obstructions in the viscera where the circulation is naturally more rapid and the quality changed by work and by debauches.

Another belief which retarded any scientific understanding of the diseases of the country, and which also retarded the patients' recovery from them was the wide practice of bleeding and the high value that the doctors placed upon it. Chevalier even bled himself frequently, not only as treatment but as a prophylactic procedure, and wrote at length on the intricate

technique of when and where and how to bleed.

Raffraichissants were quite the vogue just as they are today. Refreshing drinks were considered necessary on a great variety of occasions, especially for the purpose of preventing certain diseases. Lemonade, citronade, orange juice, and pineapple juice were popular as were also emulsions made from almonds and melon seeds. They all had particular occult powers in the field of preventive medicine. It is easy to understand their popularity then and today in Haiti purely as pleasant refreshments, but why their great medicinal powers have been so persistent and deep-rooted in the mind of the Haitian is another matter.

Cockroach oil, made by the maceration and frying of cockroaches, is another relic which has endured, and for which the few peasants who use it today should not be so greatly ridiculed when we reflect that the white man employed it for wound dressings in the 18th century. The white Haitian resident today suffers occasionally from the stupidities of his forefathers when he discovers his cook using his frying pans for the preparation of this "antiseptic."

The skin diseases were loosely classified and accordingly their treatment was haphazard. Mercurial rubs were used by some physicians for all skin diseases including smallpox and yaws. The rubs were also used for gonorrhea. Roux¹ was of course just as far off in his term "the syphilitic diseases" as those of more ancient times were with their "the venereal disease." Roux wrote that "syphilitic diseases are endemic in Saint Domingue; . . . Guaiac, sassafras and lobelia are as good as mercury and not so danger-

ous." Mercury was evidently much abused and frequently used in quite toxic doses.

Smallpox and yellow fever were the only diseases which appeared in great epidemic waves. The smallpox epidemics of 1738, 1740 and 1741, have been recorded by Pouppe-Desportes.³ Numerous others followed, the last one occurring in 1920. This last one was a great boon to vaccination, which is now made as universal as possible and to which no Haitian will now object.

Yellow fever, which had been absent in epidemic form for many years reappeared in 1794, and every summer thereafter for many years, virtually destroying the French Army in Haiti in 1803.

Yellow fever menaced the French army almost from the time of its arrival in January, 1802, destroying the morale of the troops and constantly depleting the ranks. General Le Clerc, a brother-in-law of Napoleon, who was commander of this army succumbed to the disease in November, 1802. A year later the army under Rochambeau was so ravaged by the disease that it suffered its final defeat at the last strongholds, Cape Haitien and Mole Saint-Nicolas.

Le Clerc had been advised by his medical officers to garrison the troops at Plaisance and other towns at high altitudes where yellow fever did not exist, but this may not have been consistent with military demands.

The epidemic reached its height at Cape Haitien in May, 1803. The town was thrown into consternation, the hospitals were overflowing and every house was filled with yellow fever stricken soldiers.

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ment were absurd in the light of our present knowledge of the disease. It is curious that almost exactly a hundred years later our American troops in Cuba, but a few miles from Haiti, were facing a serious threat of defeat from yellow fever, and the memorable experiments were being performed by Reed, Carroll, Lazear and Agramonte.

During the Haitian yellow fever epidemics, camphor and citrons were the "protectors" against infection. Necklaces of citrons were worn and bags of camphor were carried and held to the nose when nearing any person or object which might be a source of infection. This tradition has persisted and is widely employed today during epidemics of other diseases. The most recent epidemic was that of meningitis in the mountains of the north in the spring of 1928. In the districts involved all the children wore citron necklaces or belts and many of the adults invariably held camphor inhalers to their noses when approaching strangers or meningitis patients.

Descourtiz,¹⁶ writing about 1800, had many ideas about personal hygiene as protection from yellow fever and other diseases. He advised against bathing in or frequenting vicinities of stagnant water because of "impurities which are the source of yellow fever by their putrid emanations." He advocated the use of mosquito nets but this was simply because of "the annoyance of mosquitoes, whose bites inflame the skin and disturb the sleep."

He cautioned physicians against entering hospitals without first fortifying themselves against infection by means of a tonic drink. His method of avoiding diarrheas was the use of

"moderately spirituous drinks," and the "foregoing of all crudities which engender them." He advised his confreres to "aromatize" with orange branches the places where patients died of malignant fever. The sprinkling of vinegar upon the floor was also practiced.

PUBLIC HEALTH IN THE 18TH CENTURY

In the matter of public health these men also had their ideas. While we realize that our great grandsons may be highly amused at our present-day writings on little understood diseases, such, for example, as epilepsy and some of the psychoses, we are, despite this fact, none the less entertained by the views of Pouppé-Desportes⁴ and Dazille,¹⁵ which in regard to certain public health questions were, after all, in many respects not so far from our present-day conceptions.

Pouppé-Desportes wrote at length about the dangers of residing in mosquito-infected regions and noted that mosquitoes breed in stagnant waters. Dazille¹⁵ also condemned stagnant water and observed the greater incidence of "habitual fevers" in such towns as Petite-Anse and Petit-Goave which are located near marsh lands and remain today malarial districts. He warned the people about allowing water to stand about their homes and suggested throwing barrels of lime into the marshes in order to "absorb entirely the pestilential gas or acid." He wanted to establish a sick barracks at Dondon for soldiers who fell ill at Cape Haitien and Fort Dauphin where the "situation was vicious not only because of marshes in the vicinity but also because of the bad quality of the drinking water." He commended an officer (M. de

Loppinot) for sanitary work done at St. Marc in 1783. This officer "with very little means already accomplished much for the health of the inhabitants by filling in low areas which spread infected emanations into the air."

In the first number of the first medical journal ever published in Haiti (1802) a Doctor Delorme, then Chief of the Durand Hospital, mentions several unsanitary conditions existing at Cape Haitien:

1. The cemetery situated at the gate to the city contains 40,000 bodies, space being so limited that 30 to 40 corpses are piled into a grave.

2. The butcher shops are a menace on account of the nitrogen and other gases resulting from decomposition of animal substances.

3. Night soil dumping in great quantity near the dock. The humidity of the night disposes this matter to arise in vapors the next day by the action of the sun, and the wind carries the vapors over the city.

Among sanitary improvements he recommended are:

1. Prohibit the throwing of dead animals in swamps near the city.

2. Fill up certain swamps about the city.

3. Build several latrines at the sea side.

4. Plant trees in certain localities. These will supply oxygen, and shade, and will agitate the air and refresh the city.

5. Evacuate the Hospital of Providence; perfume it; repaint it white before using it for other purposes.

6. Clean the streets and prohibit the throwing of anything in the ditches which will obstruct the current.

Dazille¹⁵ was much concerned about the water in the wells of Cape Haitien. This water was good for cleaning and

bleaching on account of the "fixed alkali and the dissolution of silver or mercurial water" but was not good for making soap lather. It had a harsh taste, served poorly for cooking vegetables, and so "weighed on the stomach as to cause many diseases." He "analysed with care" the waters from many parts of Cape Haitien and neighboring mountain villages. From one source the water had "less sediment, was less insipid, and was not so heavy." The water in the mountains was much better, because it was "for the most part rain water and flowed rapidly over stones—by this continual agitation ridding itself of unclean properties and dirt with which it was laden."

At Port au Prince, which became the capital of the colony in 1751, the water was notably good. Dazille guessed well when he attributed the high quality of Port au Prince water to the fact that it was "conducted by good strong canals from a source far away from the city into fountains in town." He probably judged correctly the Turgeot source to be the best at Port au Prince, as this opinion was confirmed by daily bacteriological analysis more than a hundred years later. A chlorinator, the first one in Haiti, was installed at the Turgeot source in 1927.

HOSPITAL ADMINISTRATION IN THE 18TH CENTURY

During the latter half of the 18th century there existed many hospitals which were conducted under the entrepreneur system. This was a most unfortunate arrangement except for the entrepreneur. These hospitals were privately owned and were operated purely for profit. Many of the patients were French soldiers who were admit-

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ted under a contract arrangement with the government. The patients were given beds and a little food but next to nothing in the way of treatment or attention to their comfort.

Dazille complained that in these hospitals the dying would often lie in their excrement for twenty-four hours, as they usually were not seen from one morning's visit to the next. He also complained about the large profits being made by the entrepreneurs. These hospitals evidently could not even compare well with the horrible government hospitals which existed during the century of Haitian independence, since the latter, however lacking in other respects, were not maintained primarily for profit. As will be noted later, the government hospitals in the days of independence did provide considerable financial gain for certain officials but this was obtained by devious methods, did not come directly from the patients, and was looked upon almost as a perquisite. Dessalines, the first emperor of Haiti, even advised his government officials to "Plumez la poule, mais prenez garde qu'elle ne crie pas."

During Colonial days there also came into existence the hospitals conducted by the Gray Sisters. Through all the turbulent and bloody days, surrounded by every form of greed and corruption, these noble women stood faithful to their high calling and without complaint made every sacrifice. For more than a hundred years these sisters struggled against all obstacles and difficulties to provide nourishment and comfort for the sick under their care.

Dazille¹⁵ said of them in 1785:

The advantages which should make one prefer them to men in caring for the

sick are their gentleness, their patience, their cleanliness, the habits of their sedentary life, their assiduity, their constancy, their devotion, virtues belonging to their sex, the manner in which they have been trained, as well as the vow of their institution.

The organization of Gray Sisters is supported by the church. These sisters also conducted many of the girls' schools and today are in charge of the best girls' schools to be found in Haiti. Later in the days of independence they worked in the government hospitals where they were always handicapped by the meager allowance of the government. Today they are employed in the government hospitals of the Public Health Service at Port au Prince, Cape Haitien and Aux Cayes where they are in charge of such matters as preparation and serving of food, ward management, linen and other supplies, laundry and cleaning work. The Gray Sisters are white French women. Dr. Melhorn, in the annual report of the Public Health Service of Haiti for 1926-1927 pays these sisters a just tribute: "Quiet and self-effacing, these splendid workers represent the perfect type of their high calling. With herculean strength they have stood to their task and borne their added burdens with loyalty and without complaint."

Another organization, the Blue Sisters of St. Rose de Lima came into existence in Haiti much later, but was and is equally worthy and performs the same work. The Blue Sisters include many negresses and mulatresses as well as white women, all of the highest type. The blackest ones are just as efficient and possess all the splendid finer qualities of the whitest.

The military hospitals in the colo-

nial period were excellent institutions by the standards of their time. They were operated in strict military fashion and were administered under regulations that might remind one of the present-day military hospitals. Rigid rules governed the matters of admissions and discharges, hospital records, case reports, linen supply, diets, etc. The daily ration for patients on the regular diet list in one of these hospitals was 26 ounces of meat, 20 ounces of bread and one bottle of wine.

Surgery was practiced very little, either in or outside the hospitals, not because of the incompetency of the king's doctors, but because of the great frequency of postoperative infections.

THE COST OF INDEPENDENCE

The events which led to the revolt of the slaves in 1791, Napoleon's despatch of an army under LeClerc in January, 1802, and the final defeat of that army under Rochambeau in November, 1803, cannot be discussed here.

But it should be recalled in passing, that the great outstanding figure in all this turmoil was Toussaint Louverture, "the first of the Blacks." Born a black slave at Cape Haitien in 1743, he became the leading conspirator against the slavery system and against white rule in Haiti. He became the selfappointed governor of the colony in 1797. He showed great genius in his administration, using his power most effectively for promoting peace, prosperity, order and justice. While governor he was always willing and eager to cooperate amicably with Napoleon and the French government. No greater patriot and national hero ever lived; no man ever died a

more noble martyr. He was betrayed, arrested by surprise, and deported to France in June, 1802. Imprisoned by Napoleon at the Fort de Joux, he died in his cell a year later of cold and hunger.

Dark Haitian—for the time shall come,
Yea, even now is nigh—
When everywhere thy name shall be
Redeemed from color's infamy;
And men shall learn to speak of thee
As one of earth's great spirits, born
In servitude, and nursed in scorn.

WHITTIER. Toussaint Louverture

Jean Jacques Dessalines, born in Africa, and reared in slavery at Cape Haitien, became the first president of Haiti, and on January 1, 1804, signed the Act of Independence. The same year, following the example of Napoleon, he was crowned emperor, taking the title "Jean Jacques le premier."

When independence arrived, progress ceased. As we measure progress today, and by our standards of civilization, everything stopped with the coronation of Jean Jacques. Worse than that, there was an almost continual decline, not only in medicine but in every phase of civilization until 1915. Jean Jacques hated the whites. He despised even the mulattoes. This color feeling was his ruling passion. A century and a quarter has elapsed since the time of Dessalines, but one can hear children today using an expression in their native patois which shows how they sometimes share the feeling of Jean Jacques: "Dessalines pas vlez oiez blancs." (Dessalines doesn't want to see the whites.)

Dessalines wanted no whites in his empire, and his orders in this matter were most thoroughly executed.

As there were then no native Haitian medical men, one may realize

what a blow this was to Haitian medicine. Dessalines wanted no distinctions that had previously applied to the brown and yellow shades. All these were to be considered as blacks. This ruling was resented by many mulattoes in the southern peninsula and was one of the causes of Dessalines' downfall. On October 17, 1806, he became the first of a long line of murdered rulers of Haiti. Attacked by mulattoes while entering Port au Prince, he fell and was hacked to pieces by the mob.

Henry Christophe, successor to Dessalines, a few months before ascending the throne as Henry I, took frequent trips in the mountains of the north. Vandercook¹⁷ in his very dramatic account of the life of Christophe, "Black Majesty," describes in most vivid terms the ruins Christophe saw from the mountain eminences during these trips:

Christophe swept his eyes over the great plains, the hillsides, and the nestling white-washed towns in the gorges. Wherever he looked there was the same drab spectacle. The fields were forests of bramble and weeds, except where they were black from fire. Half the slopes had been raked and pitted by cannon balls and the towns were a confusion of broken mud walls and thatch that had wanted renewing for a decade . . . Under the tyranny of Dessalines, the cultivators, discouraged by the unhindered raids of the irregularly paid soldiery, had not thought it worth while to plant. Geometrically trenched fields, the smashing grind of macerators turning cane into sugar, these reminded them of the old days when white men and the hunger of the fertile land were masters. Now, were they not free? And what better thing was there to do with freedom than to sleep the drowsy days away, then dance through the night under the stare of the white moon?

Cape Haitien and the surrounding country were no more promising in appearance. Of these, Vandercook¹⁷ says:

Only a man with an excellent memory could have said which way the streets, now filled with broken bricks and mortar, were supposed to run.

. . . Black sows slept amid the mud and whitened weeds in the shadowy, molding chamber where Pauline and her young groom had slept.

The country presented the same spectacle of sorry disuse. Filthy shacks, three walls of which were mud and the fourth the side of a French planter's ruined mansion, were lost in a scrub jungle of coffee trees, sugar cane, plaintains, and bananas grown ragged and unfruitful from neglect. Over all the region, far flung and once magnificent, hung the rank odor of defeat—a carrion world that stank of wood burned by fire, sodden by rain, then dried by the dead, heavy warmth of the tropic sun.

There was much to do.

When Christophe, the ex-slave, became king, much was done. Christophe was impatient and he had unlimited power. By 1812 his palace, Sans Souci, was completed. It was then said to be the finest mansion in the New World.

He did not possess Dessalines' intense aversion for the whites. Moreover, he realized that his plans for reconstruction in his empire could not be accomplished without the aid and presence of many white men. Commercial treaties were made with the British, and Englishmen with their wares and stores began to appear at Cape Haitien. Perhaps Christophe had been influenced by his trip to Savannah during the American revolution. He made Dr. Duncan Stewart of Edinburgh his personal physician. M. J. Moor, a mathematician

cian of London, was also attached to the court.

The laws of Christophe provided that sick land tenants be given hospital and medical care at the expense of the landlord. If this was carried out, the medical attention must have been given by English doctors, as the French had not yet begun to return.

Christophe had, besides his own vision of the needs of the empire, the excellent advice of some English attaches to his court. He imported English and American school teachers and began building schools. Vandercook¹⁷ has it that a royal hospital was built and that the king's physician, Dr. Stewart, was named to fill the chair of anatomy and surgery established at the Royal College. Whether Dr. Stewart really functioned as professor at the college is not known. In any case the arrangement must have been short lived. Discontent was spreading throughout the kingdom. Too much work and discipline prevailed. Christophe's laws were too irksome. Petion, the mulatto, who was president of the republic in the south was shrewder in his way, and adopted a *laissez faire* policy which was, of course, much more popular among the peasants.

Scarcely had Christophe's great citadel, one of the wonders of the world, been completed, when Christophe was stricken with apoplexy. A few weeks later, (October 8, 1920), just as the conspirators were closing in on him, he committed suicide.

Two years before the death of Christophe, Petion died in office, and was succeeded by the mulatto, Boyer. Christophe's death resulted in the consolidation of the north and south under Boyer's government. Boyer

ruled for twenty-five years, the longest tenure known in Haitian history.

Almost nothing can be found in literature concerning medical activities in Haiti during the 19th century after 1804. Hardly a name is recorded of anyone making even a serious pretense to practice according to the European or American methods of the times. Nothing in the way of public sanitation was accomplished or attempted. Occasionally men went to Paris and studied for brief periods and returned to follow what was nearly always a strictly mercenary form of practice. These men often engaged in law practice as well as medicine and frequently devoted the greater part of their time to other commercial pursuits, such as speculations in the coffee market. (Even today it is not uncommon to find a combination doctor-lawyer-coffee broker.) Medical practice was characterized in the main by the basest and most vicious forms of charlatanry. What were called hospitals were unspeakable.

Payne¹⁸ in his report to the Rockefeller Foundation, describes four classes of practitioners existing in the latter part of the 19th century: (1) those trained in France; (2) those trained at the local school at Port au Prince; (3) "Officers of Health" of the Army, whose only claim to professional status was based on the commission from one of the presidents; (4) pure charlatans, who were numerous and everywhere. This large fourth class includes several grades, from the suave city fellow who pretended to real medical knowledge, to the small village "docteur feuille" or herb doctor, and the Papa Loi of the mountains whose powers extended beyond those of healing, and embraced matters religious and clairvoyant, sup-

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He doubtless felt the influence of several distinguished men who had graduated from this same college a few

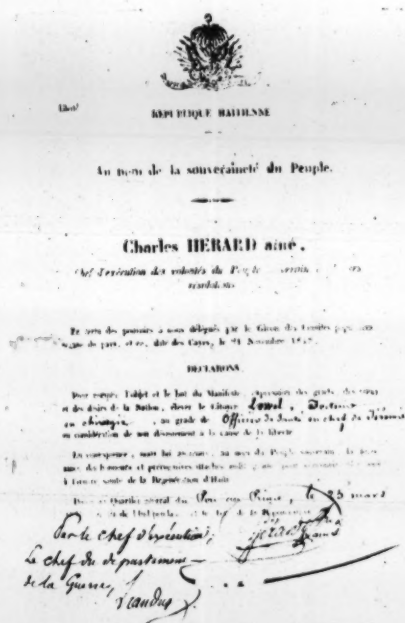


FIG. 1. LOWELL'S COMMISSION AS PUBLIC HEALTH OFFICER OF JÉRÉMIE, SIGNED BY PRESIDENT HERARD, 1843.

A medical school was established during the rule of Geffrard in the sixties. In so far as it pretended to be a serious attempt at medical education it was as farcical as our present-day colleges of chiropractic.

Haiti would have welcomed anything worthy that was offered in the nature of honest scientific medicine, but with little exception nothing was offered during the century. To the credit of Boyer, who ruled long, and for the most part, wisely, he welcomed the arrival of Dr. Porter K. Lowell in Haiti in 1833.

Doctor Lowell was born at Cavendish, Vermont, in 1809. He graduated at Bowdoin College, Maine, in 1832.

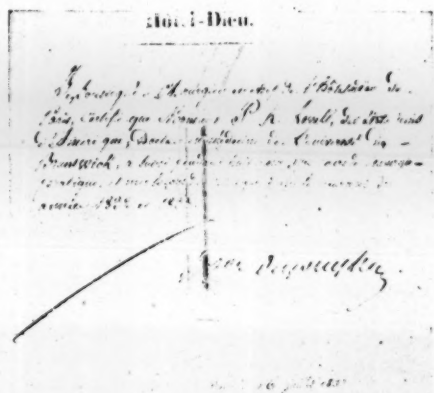


FIG. 2. LOWELL'S CERTIFICATE FROM DUPUYTREN, 1833.

years previously. Franklin Pierce had graduated in 1824, and Hawthorne and Longfellow in 1825. Longfellow was Professor of Modern Languages during Lowell's attendance and was his good friend.

Within a short time after his graduation in 1832, Doctor Lowell went to Haiti. He evidently found the country and climate so much to his liking that he decided to settle there. Before establishing himself in Haiti, however, he left for Paris to do post-graduate work in surgery at the Hôtel-Dieu under Dupuytren, and probably also for the purpose of perfecting himself in French, a great necessity if he was going to practice in Haiti.

The illustrious Baron Dupuytren was then at the height of his meteoric career. That Lowell should be inspired by such a master as Dupuytren is little wonder when one contemplates the caliber of Dupuytren. Today, a hundred years after his death, the medical literature has a good store of

references to Dupuytren's contributions to surgery, and the name of this man who had been physician to Louis XVIII and Charles X is still used for designating many surgical conditions and methods first described by him. It is an immense credit to Lowell that Dupuytren became his fast friend and his correspondent up to Dupuytren's death in 1835.

After a year at Paris, Lowell returned to Haiti and established himself in the pretty little town of Jérémie which he considered a favorable place in which to make his home and practice his profession. His life in Haiti clearly showed the wholesome influence of the association with Dupuytren.

It was a great loss to Haiti and Haitian medicine that Lowell's life in Haiti lasted only twelve short years. He practised at Jérémie in the arrondissement of Grand Anse from 1833 until his death on November 18, 1845. A license to practice medicine issued by the Jury Medical and signed by President Boyer is a matter of record.

That he was a much beloved physician in the district of Jérémie is shown by the extant highly laudatory letters and papers from the citizens of that section, attesting his skill as a physician and his high character as a citizen. He was appointed "Surgeon General of the Republic" in 1842 and served in this capacity until 1844.

During the presidency of Charles Herard, in 1843, he was appointed Health Officer of the district of Jérémie and administrator of the city hospital. During the period as administrator he accomplished the complete reorganization of this institution. So far as records can be discovered, he was the first health officer to be formally appointed for any part of the Republic.

During the presidency of Philippe Guerrier in 1844 he submitted a scheme for reorganizing the medical teaching along the line of what was in vogue in the United States at that time. He made plans and drawings for a medical school, and specifications were drawn for the equipment of the school. The perennial governmental troubles, however, prevented the realization of his plans. Revolutions were becoming frequent at that time and were proving a serious handicap to medical progress. Boyer had been deposed and exiled to Jamaica in 1843; Herard (a mulatto) deposed and exiled to Jamaica in 1844; and Philippe Guerrier (a pure black, the constantly drunken "Duc de la Marmelade") died in office, supposedly poisoned, in 1845. Louis Pierrot, the black brother-in-law of Christophe, was deposed in 1846, and Jean Baptiste Riche, a black, died in office in 1847, "the victim," says Frère Archange² "of drugs that he took for obtaining a vigor incompatible with his great age."

Not discouraged by the setbacks of these troubled times, Doctor Lowell submitted new plans for the medical education of Haitian students. His scheme was very much like that used today in the new School of Medicine and Pharmacy at Port au Prince. The failure of his high ideals for medical education was caused by the sort of political considerations that have so often operated in other countries to defeat worthy projects.

For political reasons, Lowell was arrested at Aux Cayes in 1844 and placed in prison. There it is thought he contracted tuberculosis which progressed after his release from prison, despite an extended leave in the United States. Shortly after returning

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to Jérémie from this leave, he died, November 18, 1845. His writings concerned chiefly tropical diseases and surgical questions. One important heritage he has left to Haiti is a grandson, Dr. Camille L'herisson, now an interne at the Haitian General Hospital, and one who shows great promise in the future fields of medicine and public health in Haiti.

To realize the sort of task Lowell was undertaking and the difficulties he encountered in his attempt to reorganize the hospital system and medical education, we must know something of the situation he found in the thirties and forties.

Like many other things in Haiti, hospital and medical school existence was largely "on paper" and the execution of plans was largely in the form of talk. Money actually voted for projects would usually either fail to come forth or would be diverted in great part into various private pockets. In 1808, Petion's government passed a law establishing several hospitals throughout the republic. One of 400 beds at Port au Prince, and one each of 200 beds at Aux Cayes, Jacmel, Jérémie, and Anse à Veau. These hospitals were to serve as schools for the medical personnel of the Army and were to take care of the indigent sick. The regulations governing these hospitals were lengthy and numerous but were only observed when the observance was profitable and convenient to those in power. A hospital school was maintained, after a fashion, at the Port au Prince hospital. This school taught, according to the regulations "to prepare the ordinary parts of apparatus, to make and apply bandages, to apply blisters, cupping glasses, setons, to open a boil, to extract teeth, to make injections

required by certain diseases, to extract foreign bodies, to apply tourniquets, to handle a bistoury and to make cutaneous incisions for blood letting."

In 1820 a commission was appointed to control medical education and for the purpose of putting some order into the practice of medicine. This was one of Boyer's reforms. Licenses were issued without which one could not practice. In 1823 Boyer's government launched a new enterprise by establishing a school of higher learning. It was called the Academy of Haiti and its curriculum included medicine, law, literature and astronomy. This institution was short lived and proved a failure.

In 1838 the hospital school at Port au Prince was "reorganized" and was given the name, "The National School of Medicine." This never pretended to function as a medical school in the real sense of the term until 1860, when it took on some of the actual appearances of a school, and began to confer degrees in 1870.

Despite the influence of Lowell and of the very worthy Haitian, Doctor Dehoux, from 1838 to 1860, the school never quite reached the point of being anything very much more than a name. This may well be accounted for by the political upheavals of that period when we recall Boyer's exile in 1843; the rapidly succeeding ephemeral governments of Herard, Guerrier, Pierrot, and Riche; and the "musical comedy" empire, from 1849 to 1859, of Faustin Soulouque (Faustin I).

After Soulouque had been overthrown and exiled, Haiti enjoyed eight years of the relatively splendid rule of Geffrard, of whom Frère Archange² says: "He was one of our best chiefs of state. His government,

entirely progressive, was characterized by many reforms." He reorganized the National Medical School, and founded a school of music, and a law school. Later he even founded a school of painting and one of navigation but these quickly collapsed. In order to elevate the standard of teaching he sent the most promising young Haitian teachers to Europe for special instruction. He established high schools in Port au Prince, Jacmel, and Gonaives, and installed laboratories of physics and chemistry in the high schools of Port au Prince. From all these institutions there began to appear a generation which was known as the intellectual elite.

With the existence of this class, the outcome of Geffrard's reforms, education was becoming fashionable. Since there is nothing quite so dear to the negro heart as the matter of keeping in style, much good came of the movement. The medical students wanted something more than just a degree and a license. An increasing number considered that they should be taught some medicine.

A certain real progress was made in the medical school, and about 1890 there appeared something quite novel in Haitian medical circles, a scientific spirit in the practice and a scientific outlook on the study of medicine. Several men were doubtless concerned in this renaissance but the outstanding figure was Dr. Léon Audain. Dehoux had been struggling since 1870 to bring about improvements in the medical school and elevation in the standards of practice, but his obstacles were many and he lacked perhaps some of Audain's qualities of leadership.

Audain is responsible for the first accessible records of health conditions in Haiti (under independence).

Payne¹⁸ has well summed up the influence of this man on Haitian medicine:

With unusual insight he gathered around him a group of young physicians and students who were earnest, enthusiastic and intelligent, and with his natural leadership, developed by his long Paris training, he helped them to the front rank of the Haitian medical profession. By their writings on tropical diseases this group made its presence felt in French medical literature, particularly during the period from 1900 to 1910.

Among their writings were: "Pathologie Intertropicale," by Léon Audain; "Fièvres Intertropicales," by Léon Audain and his collaborators: Charles Mathon, B. Ricot, G. Dalencour, V. Lissade and Paul Salomon; "Hémomicroblastocytes," by Léon Audain; "L'Organisme dans les Infections," by Léon Audain (this work was crowned by the Academy of Medicine of Paris).

This group of men also published *La Lanterne Médicale*, a medical journal appearing every two months from 1899 to 1911. It contained a good deal of solid scientific data, much of which came from Audain's Laboratory of Parasitology and Clinical Bacteriology which he established in Port au Prince in 1905. Not only clinical matters, but much concerning sanitation occupied the pages of *La Lanterne*. Audain collected mosquitoes and with Mathon identified them and recorded the facts in *La Lanterne*. The group was interested in the prevention of transmissible diseases and *La Lanterne* advised the authorities as to the amelioration of sanitary conditions. Audain stated in an article in *La Lanterne* in 1906 that certain cases seen by him suggested endemic beri beri. This was a keen observation

at a time when so little was known about food deficiency diseases, and his ideas about Haitian beri-beri were concurred in many years later by several American observers such as Mann,¹⁹ Payne,²⁰ and Wickersham.²¹

It is unfortunate that Audain and his group were not more concerned with the National Medical School. Perhaps they felt that that institution, because of its political nature and because of the very unstable condition of Haitian politics, could not derive any permanent benefit from their efforts.

But no matter which way the political wind was blowing, Dehoux stood steadfastly by the school and kept fighting for it. President Gelfard, whose reforms had given so much momentum to educational progress, was unfortunately exiled in 1867, and succeeded by Salnave, whose interests and thoughts were very far removed from educational matters. When Salnave was deposed and executed in 1870, Dehoux was appointed dean of the medical school by the new president, Nissage-Saget. Even executions may have a silver lining in Haiti. Under Dehoux's administration the school reached the highest development that it was to see for fifty years. Dehoux introduced dissection and operative surgery. He held clinics and recommended the development of various laboratories. A few students were even sent to Paris to complete their medical education.

Again politics interfered and again Dehoux's splendid program was frustrated. The years 1870 to 1879 saw four presidents in office (Saget, Domingue, Boisrond-Canal and Salomon), the last of whom, Etienne Félicité Salomon, found it politically

necessary to remove Doctor Dehoux from his post in 1879. Dehoux was undoubtedly the best medical man Haiti had produced up to the appearance of the Audain group. He had studied many years in Paris and had returned to Haiti to give his country the best he had for her welfare.

Although he was not restored to the deanship, his interest in the school did not flag, and he was a constant agitator in its behalf. In 1888, when the school was separated from the military hospital, he knew better than anyone and felt more keenly than anyone what the school would suffer from the change. He said: "This separation is fatal both to the school and the hospital. If this separation becomes complete, where will the school find material for its clinical teaching which is absolutely essential if the school is to perform its duties? The hospital, moreover, will suffer by the loss of personnel."

The separation remained in force until 1906 when the promulgation of a new law again brought the school and hospital together. The separation very probably furnished considerable impetus to the Audain clinics, since these became not only popular but very necessary to the students who would otherwise have been deprived of any clinical advantages.

In justice to President Salomon, whose election resulted in the removal of Dehoux as dean, it must be said that he was a well-educated and highly cultured person who worked diligently for the advancement of education in general in Haiti, although political considerations during his administration did cause great damage to the medical school. He had been minister of finance in the empire of Faustin I, and although exiled in

1859 had been greatly feared by the succeeding governments from Gelfard to Boisrond-Canal.

Profiting by his exile, he studied for many years in Europe questions of finance, administration and diplomacy and held the ambassadorial posts at Paris and London. He was responsible for many creditable reforms in national finance and certain progressive movements in commerce, agriculture and industry. In 1887 he organized the first national agricultural exposition, and the special building which was constructed for this purpose became after the exposition the lodgement of the National Medical School, and remained so until the change made under American occupation in 1927. (The building presented a rather sad sight in recent years—the second story was never finished inside and had never been occupied. The lower floor, containing four lecture rooms and a library, was beyond repair owing to the ravages of white ants.)

Salomon gave his hearty support to the primary and secondary schools, supplied them with furniture and materials for instruction, and arranged for the sending of several professors from France to be employed at the Port au Prince high school.

His nephew, Paul Salomon, became dean of the Medical School in 1910, and has remained on the faculty since, being at present the Professor of Surgery. He has been holding surgical clinics for the students at Saint François de Salles and at the military hospital (now the Haitian General Hospital) since 1910.

Salomon became dean at one of the most unfortunate periods in Haitian history. From 1910 until 1915 the governments and their presidents suc-

ceeded each other more rapidly than ever before, and each succeeding one found the country tumbling further down toward anarchy. That brief period saw seven presidents in office, four of whom were deposed by revolution, one was blown up in his palace, one died by poison, and one (Guillaume Sam, the last of the group) was murdered by the mob. As the medical school is a national institution, one can imagine the difficulties Salomon had in keeping the school together and obtaining government support.

The pay roll called for one dean, fourteen teachers, one secretary, and one janitor. Appointments to these positions were political. It is said that the salaries were paid irregularly and in part only. They ranged from \$80.00 a month for the dean to \$30.00 a month for the teachers, and \$4.00 a month for the janitor. The school boasted one microscope in 1915 and laboratory teaching was done by lectures. When the school was taken over by the Public Health Service in 1927 and a large part of the curriculum occupied by actual laboratory work, the "anti-occupationist" doctors set up a great protest about sacrificing so much of the students' time in the comparatively unimportant laboratory.

The hospital was no better off. The Haitian medical profession must not be blamed in great part for these conditions; they simply were a part of the general picture found in Haiti in 1915.

There remains almost nothing in the way of early records or descriptions of this hospital, but we know in considerable detail what it looked like and how it was conducted when the American occupation arrived in

1915. The first buildings were erected about 1845 during the reign of Faustin I. None of the original buildings remain today. They were of poor construction; some were nothing more than miserable shacks, and have been condemned and demolished since 1915. The twelve acres of ground were the site of two distinct hospitals, each surrounded by high walls. One was a civil institution supported by the commune; the other, a military hospital, was maintained by the national government.

The wards were equipped with but the scantiest of supplies and patients were rarely admitted until about to die. These structures were hospitals in name only and were unfit for human habitation. The mother provincial, a Gray nun, relates that she often went from government office to office, including that of the President, beseeching funds for the victims submitted to her care. From long and often fruitless visits she learned to accomplish best results by posting herself at the front gate of the home of the Minister of the Interior. There she would wait for an audience and occasionally obtain some measure of relief. An old official voucher has been found which covered salary expenditures in the military hospital. According to this the monthly salary of the chief surgeon was \$15.00; the remaining eleven doctors and pharmacists at the time were paid accordingly lower.

Where the surgical wards now stand there was in 1915 an old building divided into small stalls, without floors and without beds. It was full of beggars and other sick, many of whom had been wounded in the revolution of 1915. None were being treated and several were found with maggots in their wounds. The odor was so intense

that it was impossible for the American observer to remain in the rooms. Three men were lying dead among the others at the time of one visit.

There were sisters on duty but they had little to work with, and what patients could not get out to beg had to go hungry. An x-ray outfit was present, but this did not function and was the personal property of one Doctor Gaveau. Doctor Gaveau had some very decided opinions about the transmission of malaria. He maintained that the mosquito played no rôle in this, and "proved" his point by sleeping in a swamp for three weeks where he was abundantly bitten by mosquitoes and did not develop fever. Whether his blood contained parasites at the end of this period is not known.

THE AMERICAN OCCUPATION

From the foregoing it is evident that there was much to do. The sanitary problems were no less numerous nor their solution less desperate than were the hospital and clinical aspects of this gigantic task which the Americans faced. The cry was so urgent from all sides that one scarcely knew where to start. A few of the conditions existing in Port au Prince have been described; a dozen other sea ports and scores of inland villages were in equal distress. A consoling thought about this Augean stable was that it was a virgin field in which to apply the knowledge of every branch of medicine, from sanitation to hospital construction and clinical endeavor.

Here was an opportunity to measure the value of such endeavor, a chance as well, perhaps, to see its fruition in the form of brilliant achievement.

What offers the greatest mystery to the present writer, is that prior to the occupation no one seemed to know what the principal problems were or to have any conception of their magnitude. It can be understood why surveys of disease prevalence were not made before 1915 and consequently why the local doctors had very imperfectly formed opinions concerning the incidence of such diseases as hookworm and malaria. Microscopes in use were exceedingly few; no public health laboratory existed, and this may explain why no one appreciated that almost the entire populace was infected with malaria and intestinal parasites.

Even the local Germans seemed to miss the point that fatal typhoid epidemics of serious proportions were visiting Port au Prince at frequent intervals. The unavailability of Widal reactions can hardly account for this. The tendency was to diagnose the comparatively few diseases as a host of different conditions, although typhoid and the dysenteries from several causes were then commonly grouped under the vague term "intestinal fever." It is conceivable that the bugbear "typhoid-malaria" was often a reality, and with nothing but symptomatology to go by, this must have added much confusion to the picture.

But the biggest problem of all was the yaws situation, and the most difficult thing to explain is how the local medical men apparently failed to realize how tremendous it was. Lest this seem a bit harsh on the local profession, I hasten to add that the Americans themselves during quite a period did not by any means completely grasp what yaws was doing to Haiti or even appreciate that it was the great medical problem of

the land. Not until the arrival of Dr. Paul W. Wilson on the south coast of Haiti in 1922 as Public Health Officer of Jacmel was this fact ever brought out at all clearly.

There was a tradition that may have dated back even to African days which forbade people with external yaws lesions to enter the towns and villages. The disease was, moreover, always associated with shame, and although everyone had it, they were all loathe to admit the fact. The town doctors must either have failed to recognize the cases whose external lesions were healed, or they never visited the rural districts where a little investigation would have revealed untold thousands of cases with the typical skin lesions and the typical deformities.

But Wilson was endowed with an intense curiosity, not only clinical but in this instance concerning everything imaginable that had to do with this strange land and its rich folklore. He loved the mountain trails and the sturdy little horses that carried him over difficult mountain passes with unbelievable expertness and tirelessness. He saw the charm of the Creole language, and of the "mountain nigger" and his life, his laughter, his songs, his dances, and his beliefs. A fairly true idea of the yaws incidence could not long escape a person made up on such a pattern.

Wilson went to remote mountain villages where he quickly gained the confidence of the natives who had feared the *blanc*. He poured arsenicals into this seething black mass and saw yaws lesions fade away, not in individual cases, but from a whole mountain side. Without any refined Wassermann laboratory or elaborate equipment for the injection of arsenicals,

he was able to see not that a certain patient was full of yaws but that a certain valley was full of it. At a certain fork of the Gosseline river or at a certain spot on Haut Coq Qui Chant he knew that there were a thousand children with early yaws and that a pack mule could carry enough antiluetic material to change the whole face of the human element of this or that valley or mountain. He knew that the headaches and rheumatic pains and a multitude of bizarre symptoms of most of the adults were based on old yaws infections, and he knew what a few pounds of potassium iodide could do for a community in this regard.

He communicated his observations to headquarters in Port au Prince and was so insistent and emphatic that the other Americans began to see the point. The program of hospital construction was then well under way, and when consulted about the need of new buildings for the Jacmel institution, Wilson said "What Haiti needs is soap, salvarsan, and sunshine; le bon Dieu furnishes the sunshine."

He wanted to use some of the building fund for the construction of rural dispensaries in remote mountain villages so that the natives there could find all they needed in the way of antiluetics, quinine, and anthelmintics. This was not permitted, but besides drawing the plans and starting the construction of two excellent new buildings at Jacmel, the most beautiful hospital site in Haiti, he managed somehow before leaving Haiti to construct the first rural dispensary (at Colline des Chênes). He also planned for similar constructions at Fond Melon, Bainet, Perido and La Vallée. This was the beginning

of the rural clinic program. When Wilson left Haiti in 1925 a Jacmel native expressed in the strongest way known to Haitians, how much the south coast appreciated his services. This man expressed the feeling of a section which extends forty miles back into the mountains of a hundred miles of coast, when he said of Wilson, "He could have started another revolution."

He returned to Haiti a year later, in 1926, as internist for the Haitian General Hospital at Port au Prince. But this work did not offer the opportunities of pioneer days on the south coast, and American "social" and "official" life at Port au Prince, not always free from the sordid intrigues known to such atmospheres, were sorry substitutes for his mountains in the south. Except for the periods when he was engaged in his malaria surveys at Port de Paix¹¹ it is suspected that his thoughts often turned from the business at hand to his beloved Morne La Selle.*

To return to hospital construction, this was begun at Port au Prince even before the organization of the Public Health Service. Shortly after the Marines landed in 1915, Major J. A. Rossell, U. S. Marine Corps, then acting as Intelligence Officer and Public Works Officer of the Marine Brigade, took over the two hospitals in Port au Prince, bought food and other articles for them and began construction of the building which is today used for surgical

* The highest mountain in Haiti (altitude 10,000 feet); after his two unsuccessful attempts to climb this peak in previous years, this was finally accomplished by Wilson and five friends in February, 1927. For an account of this trip, see Seabrook, W. B. *The Magic Island*. N. Y., Harcourt, Brace 1928, p. 247.

wards and part of which was used for administration until 1924.

In October, 1915, Dr. R. B. Wil-

swamp lands along the water front. A marked improvement in the appearance of the city was soon noticed.



FIG. 3. PEASANTS AWAITING INJECTION FOR YAWS AT A RURAL CLINIC.

liams arrived as Brigade Surgeon and assumed charge of the two hospitals. He promptly removed the intervening wall. In the following year construction was completed on the surgical wards, operating room, maternity ward, childrens' ward and main kitchens. No construction or other work was then in progress in any of the other towns. The problems met first were those nearest at hand. Consequently the work was at first concentrated in Port au Prince.

In October, 1917, the National Public Health Service of Haiti was organized, Dr. N. T. McClean, Captain, M.C., U.S.N., being its first Director. This service took over from the forces of the occupation the control of sanitation, hospitals, and quarantine.

Improved methods of handling the sanitary work were quickly inaugurated and by the end of 1918 five motor trucks and 30 mule carts were in use in Port au Prince for collecting rubbish throughout the city, this being used to fill in the malarial

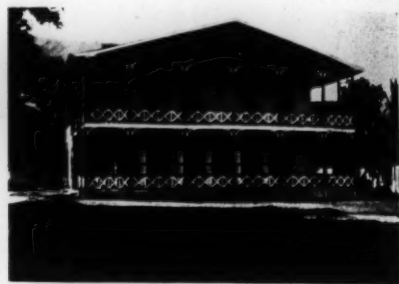


FIG. 4. NURSES HOME AND TRAINING SCHOOL, PORT AU PRINCE.

Similar work and improvement was going on at the same time in the other cities of the Republic.

Progress at first was necessarily slow. Funds and personnel were meager indeed, and the natives, having no idea as to what it was all about, and being ever suspicious and fearful of the white man, did not at once show any great willingness to cooperate. All sorts of traditions served as obstacles. It was very difficult, for example, to find native girls eligible for training as nurses, who would enter such a profession. The caste system was very strict, and girls with high school education who belonged to the better families, could not afford to enter a nurses' school, lest they lose social caste. Manual work of any sort was considered very degrading.

Nevertheless a Training School for Haitian Nurses was established in October, 1918, in connection with the General Hospital at Port au Prince. This was at first conducted by U. S. Navy nurses but as those available were not always able to speak French, these were replaced in July, 1920, by four American Red Cross nurses. This

arrangement has functioned very satisfactorily ever since. The nurses' home, which furnishes quarters for

its activities, today represents the striving and scheming, the tireless and devoted work of hundreds of



FIG. 5. SURGICAL WARDS, HAITIAN GENERAL HOSPITAL.



FIG. 6. PUBLIC HEALTH LABORATORY, PORT AU PRINCE.

about thirty student nurses, was completed in 1922. Eighty nurses have already graduated from this institution and nearly all of these are employed in the various government hospitals.

In 1919 it was possible to increase the personnel by six medical officers. This permitted the dividing of the Republic into nine districts, and placing each of these districts under the supervision of a Public Health officer. The principal seaport of each of these nine districts became the location of the district hospital and of the public health district headquarters. The public health officers were U. S. Naval medical officers and each had as an assistant, a pharmacist's mate of the U. S. Navy. The American personnel is now gradually being replaced by Haitians and it is expected that this replacement program will be completed before the expiration of the treaty. In 1924 a redivision was made to include ten districts, thus establishing an inland district around the town of Hinche.

The growth and development of Haiti's Public Health Service, with the great scope and multiplicity of

men, both Haitian and American. Enormous assistance of many kinds has likewise been contributed by the French sisters, brothers and priests. It is unfortunate that several of these personalities and a more detailed account of the aid given cannot be touched upon here.

But in all this work there seem to stand out four very conspicuous figures. One of them, Paul Wilson, has already been mentioned. A second one is associated with two epochs of this history. Dr. Kent C. Melhorn, Commander, M.C., U.S.N., first appeared on the scene in April, 1920, remaining until May, 1922. Being one of the Navy's most able clinicians, he was given charge of the General Hospital at Port au Prince. This period was one in which funds were sadly lacking and consequently one in which he was seriously handicapped in showing the full scope of his capabilities. There were other matters than building construction at that time upon which to release his energy. Port au Prince was a political hotbed and much anti-occupation sentiment was in the air. But despite one's political leaning, one was always

glad to have the best that could be found in the way of medical service for himself and family. Melhorn was



FIG. 7. PRIVATE WARD, GENERAL HOSPITAL, PORT AU PRINCE.

the quiet, painstaking, clearthinking clinician who gave everything he had in the way of diagnostic skill to every case that came to him. And then he had a way about him that won the hearts and confidence of all the hospital staff and employees and the thousands of patients that were coming in increasing numbers to the hospital.

A smallpox epidemic was spreading all over Haiti with fire-like rapidity during one year of his tour, and he rendered particularly brilliant service in handling the situation in Port au Prince.

The high morale his work and his presence brought to the institution was of an immeasurable value, which served well in the years to follow, and which redounded in the facility of his administrative work in the expansion of the service when he returned to Haiti as Director General of the Public Health Service in 1927.

The smallpox epidemic mentioned appeared in September, 1920, and remained until October, 1921. There never had been any attempt of wholesale vaccination and as there had been no smallpox epidemics for several

years, almost no one was immune and the disease spread rapidly over the island. (Epidemics of smallpox appeared in Haiti in 1865 and in 1882. The epidemic of 1882 killed more than 3000 persons in Port au Prince.)

Here was a chance to demonstrate something of the value of preventive medicine and incidentally to show the government and the people what a Public Health Service meant to them. When the natives saw that vaccinated persons did not contract the disease, they clamored for it *en masse* at all the hospitals and rural clinics. It is estimated that nearly a million natives were vaccinated during the year the epidemic lasted. Since that time routine vaccination of all school children has been in force. There are never any objections to this and thousands of adults now apply every year for it at the government clinics. Over 3000 smallpox cases were cared for at the General Hospital in Port au Prince during the epidemic, with a mortality of about 10 per cent. Without the splendid assistance rendered the Public Health Service that year by the Marine Brigade and the Gendarmerie Medical Departments, the situation would have been most difficult. The many courtesies and favors extended by these sister services to the Public Health Service will always be remembered, and the debt of gratitude to them will remain a great one.

In 1922 a special appropriation was made by the Government for the installation of a modern clinical and public health laboratory at the Haitian General Hospital. This has since been bringing most splendid returns. The whole of Haiti, with all its various medical activities, was lacking in this most important aspect of

medical and sanitary service. And real progress in our endeavor was not possible until this specialty was established. Laboratory work for every section of the country is now being performed by this laboratory and results are of course most gratifying.

Just at the time when Melhorn was leaving Haiti in 1922, there arrived on the north coast at Cape Haitien a veritable bomb shell of activity in the shape of the third member of the "conspicuous four" mentioned above. This member of the quartet, Dr. Richard H. Laning (Commander, M.C., U.S.N.), was perhaps the most conspicuous of the group; certainly he was the most spectacular; and the memory of him and his works will live in the hearts of the people of the north for many generations. The Navy Department adheres very strictly to the rule of not leaving an officer on foreign shore duty more than three years. Laning's case was very exceptional, and he was permitted to remain four years (until April, 1926). Cape Haitien is the second city of Haiti, but upon Laning's arrival there as late as 1922, it could boast of what amounted to less than nothing in the way of hospitals or sanitation. Laning proposed that Cape Haitien should have these things; and woe to any obstacle that came in the path of this man and the steam-engine sort of energy with which he pursued his purpose. The following is taken from his first annual report to the Director of the Public Health Service. He is speaking of conditions as he found them at Cape Haitien:

From a sanitary point of view of existing facilities and construction, I don't imagine that there is a so-called hospital in the world which is worse. The latrine system or lack of system is

degrading and disgusting. The kitchen is absolutely unsanitary and hopeless. The building is coming to pieces for lack of funds for its upkeep, cement falling off, foundations eaten away and lumber rotting. The available space for care of patients is so limited that all kinds of cases, surgical and medical, contagious and noncontagious have to be bunked together. Daily dressings amounting to more than a hundred have to be done in tents borrowed from the Marine Corps. The operating room would be unsanitary even as a ward. The laboratory is so small that one can hardly turn around in it. The consultation room is so small that consultations have to be given on the porch. It is in this hospital where many times more surgery has to be done than in any other hospital of the Republic, and where foreigners and natives from the whole Department of the North have to come to be treated.

To account for the fact that "many times more surgery" was being done at Cape Haitien than at the then large General Hospital at Port au Prince:

If a man preach a better sermon or make a better mouse trap than his neighbor, though he build his house in the woods, the world will make a beaten path to his door.

EMERSON.

Laning's reputation as a surgeon of high skill quickly spread over Haiti and he soon found himself swamped with cases from all parts of the island. To meet this situation he had to have a modern general hospital: buildings, equipment, personnel, organization and funds. But there was no money in sight. Nothing daunted this Rooseveltian person. He talked the Red Cross out of \$10,000; he talked the government out of some \$40,000; fêtes were given to raise money; private subscriptions poured in from business people at the Cape and from

citizens of all classes and races. From Laning's own pocket came no small part of this money. He went to the very limit of his private resources in this matter. Military regulations, the opinions of military authorities, little niceties in the way of military etiquette cropped up from time to time to hinder or cramp his program. But there was no stopping him. He always managed, somehow, to whisk these annoyances aside, as though they were so many mosquitoes buzzing about his ear.

In his enthusiasm in the construction of this magnificent hospital plant, he never forgot or neglected the thousands of natives in the mountains of the north. He was an indefatigable as the Emperor Christophe had been in these same hills. He often spent his Sundays holding these mountain clinics. In his youth he had mastered the Japanese language during some years spent in Japan. Now he had mastered Creole, the language of these hills, so he could talk to these folk and know them as they knew him. While in Japan he interested himself in Japanese schistosomiasis, his observations on this condition being quoted in many works on tropical medicine today. Just so, he became absorbed in the diseases of Haiti and devoted all the time and thought he could to their study. He could think in terms of pathology and epidemiology as well as he could in the hard financial and engineering terms of hospital construction.

From what has been said about this bustling doctor and his strenuous life at the Cape, one might imagine him a bit arrogant and possessing perhaps a larger than usual share of ego. But this was not the case. He was actually a modest sort, quiet, tolerant, patient

whenever there was the least reason for patience, and above all the most approachable person in the world.

He was close to his staff at the hospital, and there was never any race feeling in regard to the Haitian doctors on the staff. He once said to a Haitian doctor on the staff, in speaking of the race question, "Men of all colors and races are the same; they all like women, money and rum." (In the Haitian atmosphere the well known triad underwent very natural changes, "rum" being substituted for "wine," and "money" for "song").

We may see here how modestly he speaks of accomplishments at the Cape in his annual report to headquarters in 1924:

There have been many improvements at the Justinien Hospital during the past year in buildings, equipment, personnel, etc.; a roomy dispensary has been built and is functioning. Another building with operating rooms, dental room, a suite for eye and ear work, and an x-ray room has been finished. A separate kitchen, two wards, and the renovating of the old building are in process of construction. With money from private subscriptions, fêtes, etc., a beautiful structure has been built containing 16 private rooms below and two large and two small dormitories on the second floor to serve for the better class of patients. Also with money obtained from the same sources, a modern x-ray equipment has been purchased and installed. A gift of \$10,000 has been made by the American Red Cross for the erection of a surgical ward and preparations are practically completed to commence construction. Much has been done in the way of construction to transform a former almshouse into a modern hospital; much, however, remains to be done: viz., a ward for children, a maternity ward and an isolation building. The grounds should be cleaned up,

levelled and drained; roads built and gardens planted.

The program of sanitary improvements about the city of Cape Haitien kept apace with the hospital development and showed the same careful skilful planning. Everything that Laning proposed in this work was accomplished before his departure in 1926. And although the thought never entered his mind that all these beautiful and enormously useful buildings and works would stand as a monument to him, they will remain exactly that; and it is likely that they will still serve as such a monument in the years after they have tumbled into Haiti's already large collection of ruins.

When he left, broken in health and with empty pockets, he looked upon all this as just another mere incident in his busy service career. Like Wilson, he too could have started another revolution.

The years 1924 and 1925 were memorable ones. They were made so almost purely by the presence of certain personalities. Wilson was in the south, Laning in the north; many able and devoted men were carrying on in the other centers. And directing this whole service at headquarters in Port au Prince was the fourth member of our "conspicuous group."

If one views the entire work in a broad way and considers the whole in its effect on the health and living conditions of all parts of the Republic for the future as well as in the present, one cannot escape the conviction that this last member of the group made truly the greatest contribution, and in matters which belong in the annals of Haiti's medical history, he has been that country's greatest benefactor.

This personage was C. S. Butler, Captain, M.C., U.S.N. He arrived in Haiti in June, 1924, and remained as Director General of the Public Health Service until June, 1927. This sort of work was nothing new to Doctor Butler. He came to Haiti well equipped in the experience of meeting such problems. His background was twenty-five years of service in filling important posts in similar work, and this largely in our tropical island possessions. He was an authority on tropical medicine and on questions of sanitation and public health. He knew mosquitoes; he knew swamps and how to drain them. Most of all, he knew men and understood politics. He was a coordinator and administrator of a high order. He had a knack of reaching out and grabbing for his service the most capable men of the corps that were available. He expected them to work as earnestly and devotedly as he worked. This was a good deal to expect of them but he usually succeeded in this aim. Knowing men, he knew that Laning and Wilson should be given all the free rein that the law allowed, and then some. He stood behind the men in his organization to unbelievable limits as long as they were producing; but when they failed to produce through faults of their own he was swift and direct with them. There never were any compromises in his policies.

He interested himself in the general medical and public health problems of the country, decided what and where the greatest needs were, and shaped his program accordingly. He knew that if any impression was to be made on the yaws, malaria and intestinal parasites of three million people in the mountains of Haiti, treatment would have to be brought

to them in these mountains; rural dispensaries and clinics would have to be established and made to function



FIG. 8. NATIONAL MEDICAL SCHOOL, PORT AU PRINCE.

in hundreds of localities. If modern medicine was to be introduced in the cities, these cities would have to be given modern hospitals with all the necessary equipment and properly trained personnel. If the cities were to be rid of malaria and typhoid, extensive and expensive engineering projects, directed at the drainage and filling of swamps, and at the control of city water supplies, would have to be executed. Eternal vigilance on the part of scores of house to house inspectors would become a part of the mosquito control work. He knew that if medicine and sanitation was to continue in Haiti after the occupation, in the hands of Haitians, then Haiti would have to be supplied with a real medical school. This meant a real medical school building, completely equipped; and a school conducted by a Haitian faculty trained at the best medical centers in Europe and America.

For ten years under the American occupation the medical school remained apart from and very much aloof from American influence. Except for the agricultural schools, none of the educational institutions had ever come under any sort of American

control or influence. There were many Haitian doctors who were very active in politics and these were constantly crying out against any American interference in connection with the medical school. They voiced their apprehensions in high flights of oratory, and many fiery editorials on the subject appeared in the papers. But no one took this group or their utterings very seriously. The real facts of the case were too apparent and too important. Doctor Butler felt strongly on this question, and the establishment of a real school was his fondest hope, just as it had been the dream of Lowell and Dehoux. He proposed to meet political obstacles with political tools. In his annual report of the Public Health Service in 1925 he said:

What is the future of the medical school in Port au Prince? One thing is certain: it can not retain the same organization as it now has without retrograding to a state of more absolute uselessness. It must be improved if it will ever play the rôle in the future development of Haiti that, from the nature of things, it should play. How is this improvement to be brought about? It has been in the hands of the native profession for one hundred years and the final product is hardly an institution to be proud of. The fact remains, however, that it must continue to be a native institution. And it should be one to which the profession could point with real pride. The quickest way to accomplish this is to place the school under the direction of the Public Health Service. Under this direction, with the faculty assured of position as long as worthy of it, a real esprit de corps could be developed in the school, politics could no longer hamper its progress and means could be provided to continue the progress and to establish education on a firm basis.

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tory work should be introduced; the teaching should be improved by employing a certain number of full time men; decent salaries should be given to the teachers.

In placing the school under the Public Health Service, the vast clinical and laboratory material of the Haitian General Hospital could be utilized to the best advantage. The above changes could be placed in operation within a comparatively short time and coupled with a compulsory internship of one year at the Haitian General Hospital it stands to reason that the young graduate so prepared will be much better qualified to practice medicine than is the case at the present time.

At the present time we must be satisfied to develop the school along practical lines and forget the ideal of producing serious thinkers in the science of medicine. For some time to come, the production of *practical physicians* who will be able to take care of the tremendous morbidity of Haiti will be our aim.

The best way to train men to teach such subjects as physiology, chemistry, histology and anatomy is probably through a system of scholarships. It is in this connection that we should like to call upon the Rockefeller Foundation to help us out in training men for this duty.

Butler worked incessantly on his scheme of getting the medical school under his control and in arousing the interest of the Rockefeller Foundation to investigate the medical needs of Haiti and to help finance the medical school program. In these efforts he attained complete success. Dr. George Payne, and the entomologist, Dr. William A. Hoffman, arrived in Haiti in June, 1924, carried on a survey of public health conditions during a period of a year and a half, and made their report to the Foundation.

This survey had already been

planned in 1923 during a conference between General John H. Russell, U.S.M.C., American High Commissioner to Haiti, Dr. J. F. Haynes, Captain, M.C., U.S.N., then Director of the Public Health Service of Haiti, and Dr. H. H. Howard, Director for the West Indies of the International Health Board of the Rockefeller Foundation. Dr. Edwin Peterson, Lieutenant Commander, M.C., U.S.N., was appointed to duty as liaison officer with the survey. In addition to his work in connection with this survey, Dr. Peterson was associated with and played a prominent part in all matters of sanitary improvement during his three years of duty in the capacity of assistant to Dr. Butler.

In 1926 Dr. Butler was able to say in his annual report:

The question of education in medicine and of the teaching of dentistry and pharmacy were properly answered by a law enacted during July, 1926, which provided for the reorganization of these subjects and for the erection of an adequate building to care for each of these important matters. The new law provides that "Beginning August 1st, 1926, the teaching of medicine will be transferred to the Public Health Service section of the Department of the Interior." It has demonstrated the broadmindedness of his Excellency, the President of the Republic, who, seeing the great importance of this law to the Haitian people, aided so materially by advice and counsel in its enactment.

The majority of the old teachers have remained with the school in its transfer. Notable among these are Dr. Justin Dominique and Dr. Paul Salomon. The former is dean of the school; the latter is professor of surgery. These two men have given their services to the school for a number of years and have at all times tried to improve its teaching facilities. The entire faculty, made up from mem-

bers of the Haitian medical profession, has indeed shown a true spirit of cooperation.

In June, 1927, the first group of Haitian fellows of the Rockefeller Foundation left for Europe and the United States. In October, 1927, the newly completed medical school building was dedicated.

During the two years preceding the arrival of Dr. Butler, much was being accomplished at Port au Prince in the matter of construction work on the new buildings of the Haitian General Hospital. Under Dr. J. M. Minter, Captain, M.C., U.S.N., and Dr. Haynes, directors of the Public Health Service during that period, a modern roentgen ray department was installed and the private ward construction completed (May, 1923), and in the same month the first motor ambulance seen in Haiti was put into use. Also, in this month, the Asile Communal, a poor house, was opened. This removed many of the old incurables from the main hospital which could then be more largely devoted to active service.

In 1924 paved roads were built throughout the hospital grounds, and the outpatient building was completed.

In July, 1927, the new medical wards, the new administration building and the new pharmacy and dental department were opened. In December, 1927, the new kitchen; an elaborate structure which any hospital anywhere could well be proud of, was completed.

In 1927 the program of rural dispensary construction was well under way, many of these dispensaries were completed, and the natives were flocking to them by the thousands.

In the spring of 1926 a serious

typhoid epidemic visited Port au Prince, and this returned in even more serious form in the spring of 1927. Antityphoid inoculations thus became very popular in 1927 and during the epidemic it was not unusual to have a thousand persons apply for this prophylaxis in one morning at the outpatient department. Antityphoid prophylaxis became just as much a routine part of the public school visits as antismallpox vaccination had been. In addition to this work, chlorinators were installed at the sources of Port au Prince water supplies. No cases of typhoid fever among residents of Port au Prince were seen in 1928.

By 1927 a striking change had occurred in the general yaws situation. The older lesions were healed or healing and new cases were becoming very scarce. By 1928 primary yaws lesions were so rarely seen at the General Hospital as to cause considerable comment when cases did appear. At the present time these can only be seen in numbers in the most remote mountain spots and on the island of Gonave. The antiyaws campaign which had been actively in force for three years and which now amounts to a half million injections of arsenicals and bismuth per year had produced these changes. To this writer, the yaws work and its tremendous accomplishments seem the most glowing chapter in all Haitian medicine.

In May, 1927, Dr. Melhorn returned to Haiti and succeeded Dr. Butler as Director General of the Public Health Service. He is carrying out strenuously and earnestly the policies and programs which in general were developed during the regime of Dr. Butler.

Rabies has always been comparatively common in Haiti and until recent years the towns have been overrun by stray dogs that made night hideous and were perhaps a greater menace as causes of insomnia than as carriers of rabies. The service had a dog license law passed in 1926 and has been ridding the towns of stray dogs ever since. The dog truck in Port au Prince has been disposing of some 3000 dogs per year by means of a painless gas chamber. The Pasteur treatment is given free to all natives in need of it.

Noteworthy among events of the last two years are the annual conventions of the Haitian Medical Society. The first such convention was held in May, 1927. These conventions last several days, and are opened with an address by the President of the Republic. Papers, usually on problems of local importance, are read by Haitian and American members of the Society; clinics are held; visits are made to various sanitary engineering projects about the city of Port au Prince; and the session is ended by an elaborate banquet. These banquets are sights the like of which can not be seen elsewhere in the world. The convention brings together medical men, black and white, from all parts of the Republic, and to see some 30 white doctors dining and drinking at the banquet table, amicably and convivially, amongst some 50 black doctors, is a matter which will furnish food for contemplation to those who think it can not or should not be done. These black men are gentlemen in every sense that we might claim or hope to be; they surpass us in the little matters of *politesse* which they have acquired from Parisian residence or from each other. Many of

them are clinicians and surgeons of a high order. While mutual courtesy and deference prevail at these banquets, there is nothing stiff or solemn about them. On the contrary, as the evening progresses and the champagne flows, hilarity quite naturally increases, and those of whatever shade of complexion who may have been a little color-sensitive seem to become totally color-blind in this atmosphere.

The viewpoint of the Haitian doctor has undergone great changes these last twelve years. There is a small group of irreconcilables but they are no longer a drop in the bucket. The others can see the non-commercial side of medicine and realize that from the nature of things in Haiti, progressive scientific medicine can survive there only as state medicine or something closely allied to state medicine. They can all see that the big medical problems of that country are largely public health problems and must be met and thought of in terms of public health. They see the importance and significance of such research problems as that of the yaws-syphilis relationship, and just as we know what a large part malaria played in the decadence of Greek culture, they know that malaria and yaws and hookworm must have had a great deal to do with the backwardness that their nation has shown.

The Haitian doctor of the nineties and early nineteen hundreds was usually pretty much of a boulevardier (had there been any boulevards), immaculately attired, often adorned with a monocle and spotless white gloves, and usually carrying a silver headed cane. He had a ponderous air and perfect bedside manners. Now he is being rapidly replaced by such types as Hippolyte, Valmé, Madiou,

Séide, and L'Herisson, all plain, serious, quiet, studious young men more concerned with scientific medicine than with boulevard manners or the cut of their clothes.

In all this feverish work of sanitary improvement, hospital construction, and organization of personnel in the Public Health Service of Haiti during the past eight years, there sat viewing this panorama from a desk in Washington a nervous little elderly man with a little gray beard and snap-

ping blue eyes. He was just as keenly interested in it all as anyone; perhaps he felt more keenly about it than anyone. This was Dr. E. R. Stitt, Rear Admiral, M.C., U.S.N., and Surgeon General during the period under discussion. Sometimes, when he thought of Haiti, he stroked his little gray beard, chuckled, and said "My God." In the ultimate, perhaps, he had more to do with directing this work than anyone. No one was more proud of the work than he.

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THE ANATOMICAL KNOWLEDGE OF THE ANCIENT HINDUS

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FOR centuries the ancient Greeks have been held up as the wellsprings of natural science and the first competent observers and recorders in this field. As a consequence no more than cursory investigation has been made to see whether or not this great people of early times has the exclusive right to the fame thrust upon it by later generations. The results of the studies which have been made of the knowledge of other and earlier peoples have had scant hearing, not so much because of their relative exiguity as because of the opposition of tradition and long established belief.

It is but natural that our heroic concepts should have their bases in Grecian thought. The branches of the genealogical tree on which our cultural fruit developed are but the outgrowths from the massive trunk of the permeation of Europe by the Romans; a trunk the nutrition-collecting roots of which were Grecian.

Such being the case, and humans being what they are, it was to have been expected that we should consider the providing mechanism of our culture as the sole possible beginning of worth-while knowledge: being too self-satisfied or perhaps forgetting to realize that this mechanism drew its sustenance from a universal soil, and that other roots might well have grown lustily thereon.

Indeed, such happened, and particularly in the case of the ancient Hindus. Evidence for this is to be

found in their sacred literature as recorded in the literal translations in Müller's "Sacred Books of the East." For the past five years I have been diverting myself in extricating from these the material dealing with the knowledge of natural science possessed by the early Hindu philosophers. Correspondence with American scholars in the Sanskrit field has established that these translations are authentic and the classics for students. While the exact age of the originals is unknown, it is known that they had their beginnings several centuries antecedent to the Christian era; that the earlier ones were developed prior to the rise of Grecian civilization and the later ones independently thereof.

A considerable body of anatomical knowledge is to be found in these old records. The extent of it is sufficient to convince one that the ancient Hindus were keen dissectors and intelligent interpreters of the body structure. The material collected from the sources named is best presented as direct quotations from the literal translations. While this makes for stylistic disconnectedness the brevity of the statements is perhaps a relief.

Let us first see what they knew of osteology. It is written:

[The body] is kept together by three hundred and sixty bones. They are distributed [as follows]: The teeth together with their receptacles are sixty-four in number. There are twenty nails. There are as many bones to the hands and feet [one at the root of each finger and

toe]. There are sixty joints to the fingers and toes. There are two [bones] to the two heels. There are four to the ankles. There are four to the elbows. There are two to the shanks. There are two to the knees and two to the cheeks. [There are two] to the thighs, and [two] to the shoulders. [There are two] to the lower part of the temples, [two] to the palate, and [two] to the hips. There is one bone to the organ of generation. The backbone consists of forty-five [bones]. The neck consists of fifteen [bones]. The collar bone consist of one [bone] on each side. The jaw likewise. There are two [bones] at its root. There are two [bones] to the forehead, [two] to the eyes, and [two] to the cheeks. The nose has one bone, the nose bone. The ribs together with the joints [two sets]—consist of seventy-two bones. The breast consists of seventeen bones. There are two temporal bones. The head has four skull bones. Thus [the bones have been enumerated].¹

“There are thirteen ribs on the one side and thirteen on the other.”² Here the clavicle is classed as a rib. “Of the bones of the skeleton³ . . . the ribs lie against the chest.”⁴ . . . These ribs are fastened on both sides, on the breast bone and the costal cartilages.”⁵ The ribs are in the middle.⁶ The transverse processes of the ribs are designated. There are twenty in the belly.⁷

Of the skull bones specifically, note is made of the upper one,⁸ the “skull bone which is here inside the head,” and “the skull bone which is here on top of the head.”⁹

“Continuous, as it were, is this spinal column.” It has thirty-two bones.¹⁰ The vertebrae of the neck are close together.¹¹

Now “these bones in the body run both lengthwise and crosswise.”¹² But “in the wings and tail [of the bird] there is not a single transverse bone.”¹³

“There is no bone larger than the thigh bone.”¹⁴ The two thighs of the bird are the two supports with broad bones. The shoulder-blade¹⁵ and knee-bones are mentioned also.¹⁶

“The bones are inside and the flesh is outside.”¹⁷ The bones are covered with flesh.¹⁸ “Hard is the bone.”¹⁹ . . . Bones stand, so to speak . . . Flesh sits [lies], so to speak.²⁰ . . . The strength of man is in his bones.”²¹ Tooth is bone.²²

The joints were distinguished as parts of the skeletal make-up.^{23,24} “Of joints there are two hundred.”²⁵ The suture of the skull was the place where the Atman or Spirit entered man after creation.²⁶ The bones and the joints of the neck are interlinked.²⁷ “The neck joints . . . for there are fourteen of them,”²⁸ are specifically noted. The costal cartilages,²⁹ the alignment of the clavicle, and the articulations with the sternum are designated, as mentioned in an earlier paragraph.

Movement is facilitated by “the oil that lubricates the joints.”³⁰

The wrist joint³¹ is stated to be above the hand, and the elbow joint also.³² The knuckles, shanks, and back-bone are remarked as being jointed. The back-bone is, however, indistinct.³³ “There are two bending limbs in a bird’s wings . . . The bending limbs are in one third of the bird’s wing . . . the inner third.”³⁴ The joints of the little finger are three; the upper, the middle, and the lower.³⁵

“The fibre [of trees] is strong like the tendons.”³⁶

“If either walking or standing, sitting or lying, any one contracts [or] stretches [his body, then] this is the motion of the body.”³⁷

Turning now from the general

anatomy to the regional it is written of the head that "firm are the bones of thy skull."³⁸ . . . The head [is] the first of all members, . . . the head consists of nine pieces.³⁹ . . . Man's neck is small but it bears a heavy burden.⁴⁰ . . . On the shoulders this head is set.⁴¹ . . . The head is three-fold; skin, bone and brain."⁴² The upper skull bone is that on which all other bones of the skull rest.⁴³ Elsewhere it is written that "the head consists of two bones."⁴⁴ Then as now the skull was compared with a bony box, for it is written that potsherds are to the rice-cake what the skull-bones are to the head.⁴⁵ "Ground rice is nothing else than the brain." Man's "hollow head is filled with the brain."⁴⁶

" . . . where the head is there are also the jaws and the tongue.⁴⁷ . . . The tongue is . . . red.⁴⁸ . . . Beneath the two palates there hangs the uvula like a nipple."⁴⁹

There are distinguished the temples, "the outer parts of the ears, the ears themselves, the tragus of each ear, the cheeks, the eyebrows, the gums, the lips, the chin, the soft palate,⁵⁰ . . . and the nape of the neck."⁵¹

The frontal bone and behind the ear are recorded as sensitive spots to be struck in killing the sacrificial animal.⁵²

The functional properties of the head parts were recognized. Thus it is written that food is taken in from the head downward, food is eaten through the channel of speech.⁵³ "The mouth is the extreme end of the vital airs—by the chest one is, as it were, confined—the belly is a foundation."⁵⁴ Note is made of "the mouth through which he eats and drinks and lives.⁵⁵ . . . With the tongue food is eaten."⁵⁶ The tongue is "the

queen of speech, . . . is covered, as it were, by the lips [and] surrounded by the teeth, as if by spears."⁵⁷ Saliva is remarked as "water in the mouth."⁵⁸

The eye itself is the instrument of seeing . . . the nose is the instrument of smelling . . . the tongue is the instrument of saying . . . the ear is the instrument of hearing.⁵⁹ . . . These boneless eyes are set in what is bone.⁶⁰ . . . The eyes are in the front of the head.⁶¹ . . . The eyes are inside and the ears outside.⁶² . . . These two eyes are on the two sides of the nose.⁶³

The eyeball is specifically noted, as are the cornea, iris and pupil.⁶⁴ "There are the red lines in the eye . . . There is the water . . . There is the pupil . . . There is the dark iris . . . There is the white eyeball."⁶⁵ The upper and lower eyelashes are remarked.⁶⁶ It is said that "the abode of the waters is the eye, for there water always abides."⁶⁷ The opening and closing of the eyelids is stated to be a natural process.⁶⁸

Surface anatomy was the object of some attention in the ancient Hindu records. Hairy and hairless forms are noted.⁶⁹ The skin and hair are stated to be outward forms.⁷⁰ The distribution of the hair is described as being on the head, in the nostrils, in the ears, as eyelashes and eyebrows, on the abdomen, on the chest, in the armpits, on the chin as the beard, and in the pubic region.^{71,72} The central part of the face is hairless.⁷³

Of hair holes, of the hair of the head and of the head there are three hundred thousand.⁷⁴ . . . Of [atoms of] hairs [of the body] there are 546,700,000.⁷⁵ . . . As many stars are there, so many hair pits are there.⁷⁶ . . . As many hair-pits as there are twinklings of the eye, and as many sweat-pores as there are hair-pits . . . and as many sweat-pores

as there are, so many drops it rains.⁷⁷ . . . From the arm-pit water springs forth.⁷⁸ . . . Neither poison nor anything else injures one at the hair.⁷⁹ . . . Make firm their roots [the hairs], draw out their ends, expand their middles.⁸⁰

Now the body is "covered with six skins."⁸¹ It is covered with hair, skin and flesh.⁸² "Having cut into the skin, it cuts into the hide; having cut into the hide, it cuts into the flesh; [Having cut into the flesh it cuts into] the ligaments; [Having cut into the ligaments it cuts into] the bones."⁸³

"Of the sensitive parts of the body there are one hundred and seven."⁸⁴ Loins and thighs are differentiated as surface parts.⁸⁵ Other gross anatomical differentiations will be presently recorded.

Breasts are frequently mentioned and in the creation myth Pragapati the Lord of Creation "made the breasts in the fore part of [their] body to teem with milk."⁸⁶

"This navel is in front."⁸⁷ A "figure with a prominent navel" is remarked.⁸⁸ "The navel means the center, and the center is safe."⁸⁹ The navel is where the food settles, and is also the seat of seed.⁹⁰ Below the navel is the vital energy [sperm].⁹¹ The "intestinal breath [Channel] is turned all around the navel."⁹² The navel is the source of the breath of life,⁹³ "the knot of all breath."⁹⁴

Turning now from the surface of the body to the appendages, it is written that "it is from the trunk that all these limbs proceed."⁹⁵ . . . The two arms, the two legs, the belly [trunk] and the head are the six limbs.⁹⁶ . . . These limbs of man are tripartite and furnished with two joints.⁹⁷ . . . Fingers [and toes] are at the ends."⁹⁸ In four sets, five in a set, and separate. "The very tips of

the finger-nails" are noted as the tips of the body.⁹⁹ Special mention is made of the thumb,¹⁰⁰ the forefinger, the middle finger as the largest, the third finger as larger than the little finger, the shortest.^{101, 102}

The two arms are stated to be at the sides.¹⁰³ "The arms are on the fore-part of the body."¹⁰⁴ . . . Strength is exerted by the arm."¹⁰⁵ Shanks, thighs, fore-arms, shoulders, heels and buttocks are differentiated.¹⁰⁶ "The thighs [are] close to the hips."¹⁰⁷

"Of sinews there are nine hundred . . . of muscles there are five hundred."¹⁰⁸

Because there are thirty nights in the month it is said that there are thirty limbs of the body, viz. twenty fingers and toes. The upper and lower arms. Thighs, shanks and hands.¹⁰⁹ "Neither is the body in excess of the limbs, nor are the limbs in excess of the body."¹¹⁰

"The limbs do hold the vital airs."¹¹¹ . . . Breath is the sap of the limbs. Therefore from whatever limb breath goes away, that limb withers."¹¹²

The trunk is the best, the largest, and the most vigorous of all the limbs.¹¹³ "On hoofs cattle support themselves."¹¹⁴ . . . One is stronger whilst standing."¹¹⁵

Going within the body we will now record what was written of the urogenital system. The "body is outside and the womb is inside."¹¹⁶ . . . The womb of all beings . . . is in the middle.¹¹⁷ . . . I split open thy vagina,¹¹⁸ . . . in thy bladder,"¹¹⁹ and "the two bones [or muscles] at the upper end of the bladder,"¹²⁰ are statements attesting to the more or less detailed knowledge of these parts of the body. The scrotum [of the boar] is specifically mentioned,¹²¹ as are the testicles. "That organ [the penis] has one joint; but if it were

jointless, it either would only stand erect, or it would hang down; whilst now it both becomes erect and hangs down."¹²² Attention is called to "the two canals, fashioned by the gods, in which man's power rests, in thy testicles."¹²³ . . . Separate are these testicles."¹²⁴ That the testicles are the source of seed was common knowledge.¹²⁵

The functional and physiological properties of the organs were also recognized. Thus . . . "the womb bears the embryo,"¹²⁶ . . . relaxed is the opening of thy bladder, like the ocean the reservoir of water . . . I split open thy penis, like the dike of a lake—thus let thy urine be released."¹²⁷

The embryological relations were not unknown. Thus it is written that the "embryo [is] covered with everlasting darkness,"¹²⁸ dwelling "between urine and feces."¹²⁹ . . . The womb is outside and the outer membrane is inside . . . The outer membrane is outside and the inner membrane is inside . . . The inner membrane is outside and the embryo is inside. It is from these that he who is born is born.^{130,131,132} . . . The embryo and the inner and outer membrane."¹³³ These quotations are evidence of knowledge of the amnion and chorion.

The waters enclose the offspring [embryo].¹³⁴ . . . The womb lies all round the child.¹³⁵ . . . The womb does not injure the child . . . It is by the head (issuing first), by the top that he who is born is born.¹³⁶ . . . The womb does not enlarge along with the child that has been born, only as long as the child is within the womb, does the womb enlarge, and so long, indeed, the growth of the [unborn] child here [lasts].¹³⁷ . . . Attached not at all to the flesh, nor to the fat, not at all to the marrow, may the splotted moist placenta come down.¹³⁸

The anatomical knowledge of the circulatory system possessed by the ancient Hindus was noteworthy. They wrote that "the heart which is in the middle"¹³⁹ is smooth and round, it lies in the vicinity of the arm-pit, it is boneless.¹⁴⁰ "The heart is the Self, the Mind—the heart then is the animal."¹⁴¹ . . . From his heart in his breast his courage flowed."¹⁴² Specific mention is made of "the small cavity of the heart."¹⁴³ Knowledge was had that the heart is enclosed in the pericardium.¹⁴⁴ Notation is made of the net-work within the heart,¹⁴⁵ which undoubtedly refers to the papillary muscles. "The red lump within the heart,—in the cavity within the heart, and the ball of blood which is there,"¹⁴⁶ is undoubted reference to the post-mortem clot.

The point of the heart where the veins leave is designated.¹⁴⁷ "The heart where the arteries meet, like spokes fastened to the nave."¹⁴⁸ Note is made of "the great artery" or aorta.¹⁴⁹ The ascending aorta is called "the artery that rises upwards from the heart," like a roadway.¹⁵⁰ The artery going from the heart to the eye is divided into two.¹⁵¹ The artery going upwards serving as the passage of the Prana, is divided within the palate.¹⁵² "There are a hundred and one arteries of the heart, one of them penetrates the crown of the head."¹⁵³ . . . There are seventy-two thousand arteries called Hita, which from the heart spread through the body."¹⁵⁴

It is impossible to determine whether or not the ancient Hindus had any conception of the circulation. The following quotations would seem to suggest, however, that if they had no exact knowledge thereof, they at least had an idea of what it is all about.

Firm . . . [is] the beat of thy heart.¹⁵⁵ . . . The arteries of the heart . . . ex-

tend from the heart of the person towards the surrounding body. Small as a hair divided a thousand times, they stand full of a thin fluid of various colors, black, white, yellow, red.¹⁵⁶ . . . Like a hair divided into a thousand parts, so are the veins of it—firmly placed within the heart. Through these indeed that [food] flows on flowing.¹⁵⁷

Further implication of knowledge of the capillaries is had from the statements that:

There are in his body the veins—which are as small as a hair divided a thousand-fold, full of white, blue, yellow, green and red.¹⁵⁸ . . . There are one hundred and one arteries, and in each of them there are a hundred [smaller veins], and for each of these branches there are seventy-two thousand. In these the Vyana moves.¹⁵⁹

[The] body is provided with . . . tubular vessels [carrying bile and phlegm through the body], tubes [conducting the vital airs], and sinews.¹⁶⁰ . . . There are in this human frame seven hundred tubular vessels [or arteries carrying bile and phlegm through the body].¹⁶¹ . . . Of tubular vessels [or arteries] the branches of the smaller tubular vessels there are 2,900,956.¹⁶²

All this indicates, to the writer at least, a knowledge of the circulation and of the relation of the heart thereto.

In addition to the channels for the blood, the vital airs are said to be connected by channels inside the body in which they meet. "Of tubes [conducting the vital airs] there are three hundred thousand.¹⁶³ . . . The navel, the principle of vital action [which dwells in the heart], the anus, semen, blood, the temples, the head, the throat, and the heart, are the seats of the vital airs."¹⁶⁴ The hind-part is an opening for the vital air.¹⁶⁵

Of the viscera, both thoracic and

abdominal, much was known. The lungs were stated to be on the sides of the body.¹⁶⁶ "The heart is highest, then [comes] the belly, then the womb.¹⁶⁷ . . . The belly is the center.¹⁶⁸ . . . The left side of the belly of a well filled beast is more raised [than the right side]."¹⁶⁹ The omentum is in the belly.¹⁷⁰

The belly and the womb are close to each other . . . Both the belly and the womb are connected with flesh . . . The belly is higher, and the womb is lower.¹⁷¹ . . . Twenty are the parts in the belly.¹⁷² . . . The belly [is] the support of all food.¹⁷³ . . . Food of all kinds is put together in the belly.¹⁷⁴

Verily, the intestines are confused, some small, some large . . . Verily, the intestines are according to rule, as it were; some shorter, some longer.¹⁷⁵

Adeps, marrow, the left lung, the navel, the right lung, the liver, the spleen, the small cavity of the heart, the kidneys, the bladder, the rectum, the stomach, the heart, the large cavity [intestine], the anus, the belly, and the two bowels in it, [are the inner parts of the body].¹⁷⁶

Elsewhere the entrails, canals, abdomen, belly and guts are noted as distinct.¹⁷⁷

Beyond the above-noted anatomical relations others are found recorded here and there. Thus there are "five layers" from without inwards;¹⁷⁸ hair, skin, flesh, bone, and marrow.¹⁷⁹ Muscle is held distinct.¹⁸⁰ "Outside is the heart, and inside is the body.¹⁸¹ . . . The trunk of the body is in the middle."¹⁸² An animal is biggest towards the middle.¹⁸³ "What is above the navel—what is below the navel" is distinguished.¹⁸⁴ More pure "is that part of the animal which is above the navel, and more in contact with ordure is that which is below the navel."¹⁸⁵ The "seed is below, and

the milk above.¹⁸⁶ . . . The cavities above the navel must be considered as pure. Those below it are impure . . .¹⁸⁷

The pupils of the eye, the eyelashes, the outer parts of the ears, the ears themselves, the tragus of each ear, the cheeks, the eyebrows, the temples, the gums, the lips, the cavities of the loins, the two groins, the scrotum, the two kidneys and breasts of females, which are composed of phlegm, the uvula, the hind parts, the arms, the shanks, and thighs, the fleshy parts of the shanks and thighs, the palate, the two bones [or muscles] at the upper end of the bladder, the chin, the soft palate, and the nape of the neck; these are the places [of vital energy] in the body.¹⁸⁸

The body is made of pairs.¹⁸⁹

In order are given the legs, pelvis, abdomen, thorax, neck and head.¹⁹⁰ Knee-high is below the rest of the body, "navel-high is, as it were, the middle."¹⁹¹

Selectively noted in one place are the back, belly, chest, sides, forepart and hindpart.¹⁹² There are three erect parts of the body; the chest, neck and head.¹⁹³ The vigor of animals is in front.¹⁹⁴ "As far from that vital air as the chest is in front, so far are the hips behind."¹⁹⁵

The "nose, eye, skin, tongue and ear are the [five] organs of perception."¹⁹⁶ The "hands, feet, anus, parts of generation, and tongue, are the [five] organs of action."¹⁹⁷

Seven places which retain the moisture have been declared; the hands, the lines

in the hand, the nails, the top of the nails, the brows, the under lip, the upper lip.¹⁹⁸

The body which is put together with bones and sinews, plastered with membrane and flesh, and covered with skin, is not seen as it really is. It is filled with the intestines, the stomach, the lump of the liver, the abdomen, the heart, the lungs, the kidneys, the spleen. With mucus, saliva, perspiration, lymph, blood, the fluid that lubricates the joints, bile and fat. Then in nine streams impurity flows always from it; from the eye the eye excrement, from the ear the ear excrement. Mucus from the nose, through the mouth it ejects at one time bile and [at other times] it ejects phlegm, and from [all] the body come sweat and dirt.¹⁹⁹

Five forms [bodily parts] of him are mortal, the hair on the mouth, the skin, the flesh, the bone, and the marrow; and these are immortal—the mind, the voice, the vital air, the eye and the ear.²⁰⁰

In concluding this record of the anatomical knowledge of the ancient Hindus it seems well to call attention to the fact that these early observers did not consider humans as species differentiable on an anatomical basis. For they wrote that "difference there is in beings endowed with bodies, but amongst men this is not the case, the difference amongst men is nominal [only]."²⁰¹

It is hardly necessary to expatiate upon the material presented here. It speaks for itself and attests to the breadth of anatomical interest possessed by our scientific forbears.

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Brih. Up. Brihadaranyaka Upanishad. Vol. 1
Hiran. Hiranyakesin. Vol. 30
Kath. Kayha Upanishad. Vol. 15
Kausht. Kaushitaki Upanishad. Vol. 1
Khand. Khandogya Upanishad. Vol. 1
Kulla. Kullavagga. Vols. 17: 20
Mait. Maitrayana Upanishad. Vol. 15
Milind. Milinda. Vols. 35-36

Mund. Mundaka Upanishad. Vol. 15
 Prasna Prasna Upanishad. Vol. 15
 Sanats. Sanatsugatiya. Vol. 8
 Sank. Grih. Sankhayana. Vol. 29
 S. B. Satapatha Brahmana. Vols. 12:26:41:43
 Sutt. Nip. Sutta Nipata. Vol. 10
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 Tait. Taittiriya Upanishad. Vol. 15
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SOME EARLY AND LATE ILLUSTRATIONS OF COMPARATIVE OSTEOLOGY

By E. W. GUDGER, PH.D.

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HE would be a bold man who would attempt to fix a date for the beginning of comparative anatomy, since for such a thing an omniscient knowledge would be required. However, in a general way it may be said that Aristotle first laid the foundations of comparative anatomy. He is said to have dissected about fifty animals, probably nearly half of them vertebrates. It is also probable that he was the first to recognize the fundamental unity of structure in the backboned animals. In this connection he writes: "Whatever parts a man has before, a quadruped has beneath; those that are behind in man form the quadruped's back." However, it is fairly well agreed that the first book, in which there is made a definite comparison of the bodily structures of vertebrate animals with each other and with similar organs in man, is the "Zootomia Democritea" of Marco Aurelio Severino.¹ This man, a native of Tarsia in Calabria, and a professor and surgeon at Naples, published his noteworthy work at Nuremberg in 1645. So rare is it that, so far as I know, there are but three copies in the United States: originals in the

libraries of the Surgeon General's Office, and the Academy of Natural Sciences of Philadelphia, and a photostat copy in the library of the American Museum.

Equally as difficult as the setting of a date for the inception of comparative anatomy as a whole is the dating of the beginning for one of its parts, comparative osteology. However, we can fairly definitely fix the time of the drawing of the first figures in this latter subject, and when we remember that the earliest anatomy was osteology, and that the first anatomical figures were for the most part those of the bones, it is not strange that the first published figures showing homologous structures were osteological ones. To bring forth these earliest figures and add to them others of later date, of artistic beauty and scientific value and hence possibly of equally great interest, is the purpose of this paper.

The first figure known to me comparing osteological structures is found among the artistic remains of that many-sided genius, Leonardo da Vinci (1452-1519). Leonardo studied human anatomy not only to perfect his art as sculptor and painter, but for its own sake. And when one contemplates his great genius and his ever-present desire to learn, it is not surprising to find that he dissected and drew the bodily structures of animals other than man. Hence it is not going too far to say that he was not merely

¹ It is true that the English physician, Edward Wotton, had published at Paris in 1553 in folio his "De Differentiis Animalibus" in which he had sought to bring into some definite order the anatomical data of Aristotle, Pliny, and Galen, but his book is not of the same caliber as Severino's.

one of the founders of the study and portraiture of human anatomy, but of comparative anatomy as well.

Vangensten, Fonahn, and Hopstock, Christiania, 1911-16. Our interest lies in the latter, which probably represent

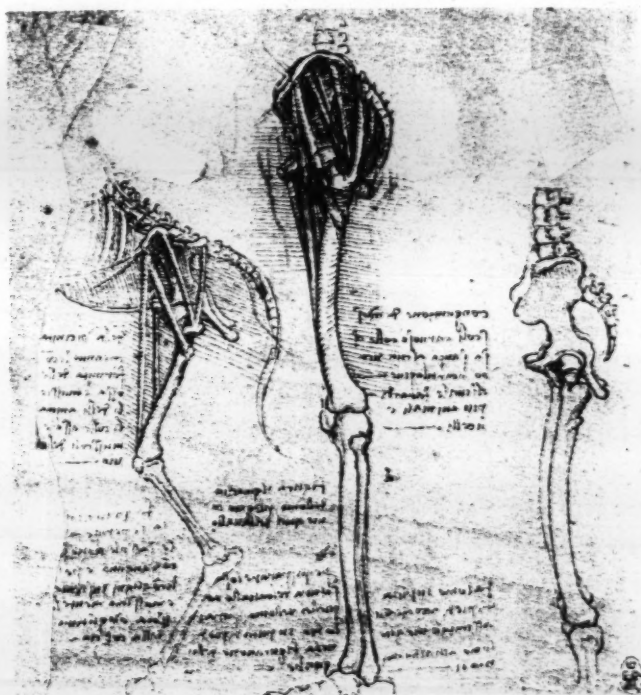


FIG. 1. DRAWINGS BY LEONARDO DA VINCI SHOWING HOMOLOGOUS BONES IN THE LOWER SPINAL COLUMN, PELVIS, AND LOWER (HINDER) LIMB OF MAN AND HORSE. THE CENTRAL AND LEFT FIGURES ARE DRAWN WITH CORDS ATTACHED TO REPRESENT SOME OF THE MUSCLES. (FROM VANGENSTEN, FONAHN, AND HOPSTOCK, 1916.)

After Leonardo's death in 1519, his manuscripts were kept together for a while, but there being in that day no great libraries where such precious materials could be collected and cared for, they were finally widely dispersed. Thanks to the Earl of Arundel, the greater part of the anatomical manuscripts were brought to England and finally came to rest in the Royal Library at Windsor. These have been adequately reproduced in two series: the one as *Fogli A and B*, Paris, 1808 and 1901, edited by Sabachnikoff and Piumati; the other in six volumes, the *Quaderni d'Anatomia* edited by

Leonardo's earlier anatomical dissections and drawings. The reproductions are in absolute facsimile, even to the water stains on the sheets.

The very similar organization of the hind limb in the vertebrates must have struck the early anatomists, but Leonardo seems to have been the first to figure this and to make definite reference to it. On folio 22 recto of *Quaderni v* is found the figure reproduced herewith as Figure 1. On the right we have the lower spinal column, the pelvis and upper leg bones of a man; in the center the same with cords attached to represent some of

the muscles; and on the left the same bones of a rearing horse, also with cords to represent the same muscles. Here then is the earliest figure known to me in comparative osteology. Unfortunately it is not dated.

The notes on this sheet are in old Italian written backhandedly (i.e. from left to right, mirror writing) since Leonardo was left-handed. That inscribed on the upper right between the two skeletons of man reads as follows: "Conjunction of the fleshy muscles with the bones, without any tendon or cartilage—and the same you shall make in several animals and birds." The note just below this is even more significant, since it shows that Leonardo knew that the animals other than man walked on their toes, and that man's skeleton must be so drawn to give a true parallel. It reads as follows: "Represent a man on tip-toe, that you may better compare man with the other animals." The upper note between the legs of the man and the horse is: "Figure the knee of a man, bent as that of a horse." The lower note here reiterates the statement in that to its right: "To compare the structure of the bones of the horse to that of a man, you shall represent the man on tip-toe in figuring the legs." To the left of the leg of the horse, the upper note reads: "On the affinity which the conformity of the bones and muscles of the animals have with the bones and muscles of man." The note below this is a more generalized statement and contains no comparisons. Here Leonardo merely says: "First make the bones separate with the sockets where they join, and then join them together, and especially the hip-joint, or the joint of the thigh."

So firmly established in Leonardo's

mind was this idea that a similar statement is found on folio 23 recto. Here are the abdomen and legs of a muscular man so drawn as to show in admirable fashion the topography of the muscles. Alongside this Leonardo has a note as follows:

Second demonstration, interposed between the anatomy and the living.

For this comparison you shall figure the legs of frogs which have great similarity to the legs of a man, as well in the bones as in their muscles; then you shall let follow the hind legs of a hare, which are very muscular and with expeditious muscles, because they are not impeded by fat.

Leonardo's figure of the pelvic and leg bones of man and horse have been admirably reproduced by Hopstock (1921), one of the editors of the "Quaderni," in an article on "Leonardo as an Anatomist." In this he also calls attention to Leonardo's efforts at comparative anatomy.

The sixteenth century was a remarkable one for its sudden "breaking out" with great students of natural history, men who brought together the knowledge of the past and added to it that of themselves and their contemporaries. One has but to recall the names of Rondelet, Gesner, Belon, Salviani, and Aldrovandi (all born within a space of fifteen years in the first quarter of that century) and to visualize their huge folio tomes filled with all the scientific knowledge of the past and of their own day, to realize that there were giants in those days. These men varied much in the originality and the ability with which they handled their vast data, and parts at least of their huge compilations are comparatively worthless, but at least they brought together everything known about animals.

Their works are source books of great value, and on them as broad and secure foundations the natural histories of all time since have been built.

The first of these men to publish was Belon, and it should be noted that he perhaps least of all refers to the works of the ancients. He went to nature herself and his books contain largely only his own observations. He was born near Le Mans (Sarthe) in 1517 and was killed by an assassin in Paris in April, 1564. He had for his day and time an excellent scientific training, having taken the degree of doctor of medicine at Paris, and having studied at Wittenberg under the celebrated botanist, Valerius Cordus. The Cardinal de Tournon became his patron and sent him on an extensive journey (1546-1549) in the Levant, the first of many like journeys undertaken by young scientific men in later centuries in the same region.

On his return Belon published three works on fishes, and another dealing with the observations he had made on his journey. Then in 1555 he published a work in which are given the two remarkable figures now to be reproduced. Chapters x and xi of his book on birds deal with the sizes and external parts and with the internal structures of birds, while Chapter xii bears the significant heading set out in the reference in the bibliography at the end of this paper: "The anatomy of the bones of birds compared with those of terrestrial animals and man."

Belon prefaces his chapter with the statement that birds of different varieties have body parts of varying proportions large and small, with internal bony structures agreeing with these varying proportions. Then he continues:

No bird has fallen into our hands without its undergoing an anatomical examination when it was possible to make one. Thus we have examined the internal structures of 200 different species of birds. So it is not strange that we are able to describe and figure the bones of birds in such an exact fashion . . . Whoever takes the wing or the leg of a bird and compares it with that [the arm or leg] of a four-footed animal or of a man will find the bones almost (*quasi*) corresponding with each other . . . We do not attempt here an exposition of anything except to show how nature varies her work, almost as if the [structures] of one animal were dependent on those of another, and to show how those of the birds are connected [with those of other animals] more closely than is generally admitted. Therefore we wish to make it clear that we are now comparing the structure of the human bones only with that of the birds, promising to do the same for the other animals, each in its place.

Then he goes on to show that in the skulls of the birds there are the same bones, which he calls parietals, occipitals and petrous bones, that are found in the skull of man, connected by the same coronal, sagittal and occipital sutures. He notes the differing numbers of cervical vertebrae and of ribs in birds and man, compares the other bones in both, shows that they have the same general form, curves, depressions and eminences, and finally he notes that the attachments are the same in both. Thus he goes through the whole skeleton in a general way.

Having made these general comparative statements, Belon conclusively adds: "But having first demonstrated the anatomy of the human bones, let us now compare these with the bones of the birds and let us make this clearer by figures. It

will then be easy to follow the demonstration of each bone in the order set forth" (Figs. 2 and 3).

Portraict de l'amas des os humains, mis en comparaison
de l'anatomie de ceux des oyseaux, faisant que les
lettres d'icelle se rapporteront à celle cy, pour
faire apparroistre combien l'affinité est
grande des vns aux autres.

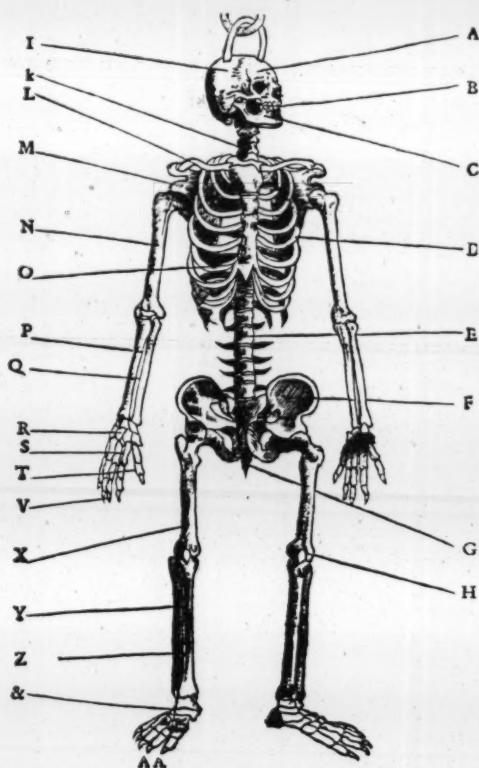


FIG. 2. SKELETON OF A MAN FOR COMPARISON WITH THAT OF A BIRD. (AFTER BELON, 1555.)

Here then we have the first known illustrations comparing two whole skeletons, and certainly in the history of comparative osteology there is nothing more interesting and instructive than this beginning of the comparison of the complete bony structures of these two vertebrates.

The reproduction in facsimile (by photography) of Belon's table of identical lettering of the like bones in the two skeletons (Fig. 4) shows how definite are his comparisons and how clear his homologies. Surely these figures and explanatory remarks put Belon down as an original investigator and thinker of the first rank in the times in which he lived. In fact, he was far ahead of his times.

While these figures have been comparatively unnoticed, still they have been reproduced a few times. Belon himself reproduces them in another work published at Paris, 1557. They are found on page 4 of that volume, and the figures are exact reproductions of those given here. However, the legend at the head of each figure is entirely different, and at the feet of each is a four-line rhyming verse. These verses read as follows; that at the foot of the man first, that below the bird following next in order:

Des os humains la vraye pourtraiture
Soit des oyseau mise en comparaison,
Et lon verra que non pas sans raison
En les estais se iouï la nature.

La section d'un oyseau soulement
De tous oyseaux l'interieur demonstre:
Bien que les uns soient de petite monstre
Autres trop grands, autres moyennement.

One wonders that Conrad Gesner, that universal naturalist, whom hardly anything escaped, does not refer to or reproduce Belon's figures. But this is possibly explained when it is recalled that his "De Avium Natura" and his "Icones Avium" were both published in 1555, the year in which Belon's book saw the light. However, so far as I know, they were not reproduced in any of the later editions of these works, which to one acquainted with Gesner is rather unexpected.

Not so, however, Gesner's fellow vandi's history of monsters (1642).
 encyclopedist, Ulysse Aldrovandi, Here we find them inserted on pages
 whose great work on natural history 87 and 88 at the end of a section

La comparaison du fufdit portraict des os humains monstre com-
 bien cestuy cy qui est d'un oyseau, en est prochain.

Portraict des os de l'oyseau.

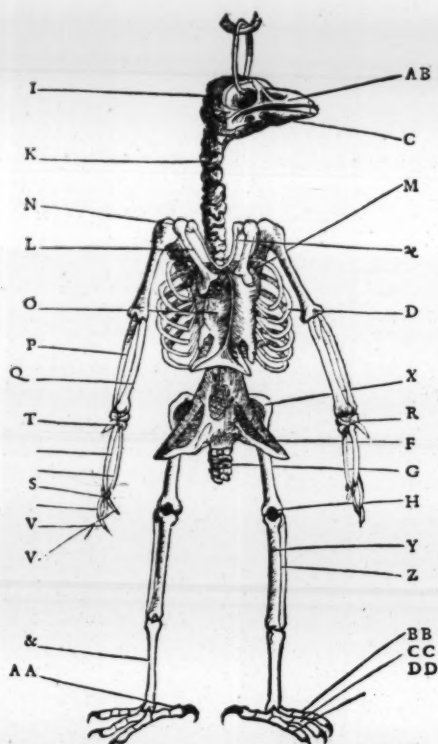


FIG. 3. SKELETON OF A BIRD FOR COMPARISON WITH THAT OF A MAN. (AFTER BELON, 1555.)

appeared in thirteen huge folio volumes. He (or his pupil, and after his death his editor, Bartholomaeus Ambrosinus) reproduced these figures in 1642. One looks in vain in his three folio volumes on birds ("Ornithologiae," 1599, 1604, 1603) for them. However, in Tome 1, page 122, is the skeleton of an eagle labelled, and on page 643 that of a parrot unlabelled. But for our figures from Belon, we must go, strange to say, to Aldro-

devoted to the anatomy of the human generative organs. The last three paragraphs of this section (which immediately precede the figure of the man's skeleton), deal with the bones of man. The only statement relative to the figures is a very indefinite one to the effect that to bring about a better acquaintance with the bones and for the reader's greater convenience in recognizing the harmony between the skeletons of man and

bird, these are portrayed in figures and the originals are found in [his] museum. Aldrovandi's explanation of

scientific world to the fact that these interesting homologies were first pointed out by Belon. Crié empha-

AB Les Oyseaux n'ont dents ne leures, mais ont le bec tranchant fort on foible, plus on moins selon l'affaire qu'ils ont eu à mettre en pieces ce dont ils vivent.

M Deux pallerons longs & estroicts, vn en chascun costé.

L'os qu'on nommé la Lunette ou Fourchette n'est trouué en aucun autre animal, hors mis en l'oiseau

L Les os des deux clefs

N Les os des bras ou espaulles.

O Le cofre de la poitrine.

P Le petit os du coude

Q Le gros os du coude.

R L'os du pognet nommé Carpus.

S Les neuds & articulations nommees Condili.

T L'alleron nommé Appendix, qui est en proportion en l'alle au lieu du poulce en la main.

T L'os d'apres le pognet nommé Metacarpium.

V L'extremité de l'alleron, qui est comme les doigts en nous.

V Plusieurs os au bout de l'alle, dont deux ont forme de nauettes, l'un plus grand & l'autre plus petit, qui est en proportion à l'oiseau, cōme en

D Six costes, attachees au coffre de l'estomach par deuant, & aux six vertebres du dos par derriere.

F Les deux os des hanches sont longs, & en ont aucunes vertebres au desous des costes.

G Six osselets au cropion.

H La rouelle du genoul.

I Les sutures du test n'apparoissent gueres sur qu'il soit bouilly.

k Douze vertebres au col, & six au dos.

nous le creux de la main, qu'on nome en Grec Thenar, & en Latin Palma.

X Les gros os des cuisses, vn en chascun costé.

Y Le gros os de la iambe.

Z Le petit os de la iambe.

& Les donnés pour iambe aux oyseaux, correspondant à nostre talon.

AA Tout ainsi qu'aons quatre orteils es pieds, aussi les oyseaux ont quatre doigts, de quel celui de derriere est donné en proportion, cōme le gros orteil en nous.

BB Quatre articulations au doigt de dehors.

CC Trois articulations en ce doigt.

DD Deux articulations en ce doigt, comme en celui de derriere.

FIG. 4. BELON'S TABLE OF LETTERING OF HOMOLOGOUS BONES SHOWN IN FIGURES 2 AND 3. (AFTER BELON, 1555.)

the letters is a rough translation of Belon's but it much more closely approaches our modern nomenclature. It is strange, however, that Aldrovandi does not refer to the figures, and even more remarkable that he does not record that they are copied from Belon, since in his other works (that on fishes particularly) he quotes author, book, chapter and paragraph. Possibly this lack is to be charged to Ambrosinus.

The next reproducer of Belon's figures is Louis Crié, who in 1882 first called the attention of the present-day

sizes the fact that Belon's whole work on birds is a distinct scientific contribution and marks the beginning of the change from mere compilation from previous writers to real scientific observations and deductions.

Last of all, Charles Singer (1921), one of the foremost students of the history of anatomy, reproduces these figures and falls into a curious error. He labels his reproduction as follows: "From Pierre Belon, *L'histoire de la nature des oyseaux*, Paris, 1555." However, the legend above each figure and the four line verse below each

show that he has reproduced the illustrations from Belon's "Portraits d'Oyseaux," etc., Paris, 1557. Various other historians of zoological science (Locy, Miall, et al.) make brief mention of these figures, but so far as I know no one else has reproduced them.

Acting on a brief statement in some of the authorities that Vesalius, in the 1543 edition of his "De Humana Corporis Fabrica" had given some figures in comparative osteology, I looked up his book in the library of the New York Academy of Medicine, and found on page 36 the figure of a man's skull with the maxillary region resting on top of a dog's skull. This is also found on page 47 with a brief statement calling attention to the marked similarity of bones, sutures, and foramina. However, the figure (which does not possess the beauty of the other Vesalian drawings) does not seem of sufficient value to warrant inclusion here.

Next we come to Volcher Coiter, an eminent Dutch (Frisian) anatomist, who was born at Groningen in 1534. Coiter had the best scientific training his day could give. In Italy, he studied under Arantius and Aldrovandi at Bologna, under Eustachius at Rome, and under Fallopius at Padua; in France, under Rondelet at Montpellier. Great as were his achievements in the anatomy of the soft parts, and in embryology and physiology, interest here must be centered in his work in comparative osteology.

If not Coiter's first published work, certainly the first of interest in this connection is his "De Ossibus et Cartilaginibus Corporis Humanae Tabulae," Bononiae, 1566, f°. This work seems to have been without illustrations, but Choulant (1920) says that in the copy examined by him

there were 5 copper plates of the skeletons of an ape and of various other animals. There was no reference to these in the text, and they seemed to be added as an afterthought. Choulant notes that they were reproduced in one or the other of Coiter's works next to be referred to. No copy of the above work is found in New York, and I have not been able to verify Choulant. However, examination of the second of Coiter's works (1575) now to be referred to, reveals the presence of the five plates in question. Presumably they were accidentally bound up in the 1566 work, probably in a rebinding of this book.

Coiter later published two anatomical or better osteological works at Nuremberg, in 1573 and 1575. The first of these is entitled "Externarum et Internarum Principalium Humani Corporis Partium Tabulae," etc. The table of contents of this work shows that it consists of fourteen parts ("Tabularum, Figurarium et Opusculum"), of which No. 9 bears title as follows: "Analogia Ossium Humanorum, Simiae et verae, et caudatae, quae Cynocephali similis est, atque Vulpes." How scientifically Coiter went at his task is indicated by the headings of the chapters of this section. After considering the "universal difference" between the bones of men and apes and the differences between the "true and tailed apes," he deals with his subject by regions. He studies consecutively the head and pharyngeal region, the neck and its vertebrae, the thorax and the parts annexed to it, the lumbar region, the bones of the sacrum and pelvic arch, the anterior limbs and joints, the legs, and lastly the bones and parts of the feet. And everywhere he compares part with part and bone with bone.

Lastly, the fourteenth (final) section is made up of anatomical observations on various quadrupeds ("diversis brutis"), on the sheep, goat, dog, cat, lizard, frog, viper, turtle, bat, fowl, ox, pig, hedgehog, and birds (apparently as distinguished from the domestic fowl). These notes seem to be by way of anticipation of the 1575 work presently to be considered.

The first work (1573) has 7 plates. Nos. 1 and 2 are front-lateral and rear-lateral views of the skeleton of a child. No. 3 gives two views of the base of a man's skull, seen from below, and in mid-front to back horizontal section. No. 4 shows the skull of a child portrayed like the preceding. No. 5 shows a man's skeleton in rear-lateral view, the hands being folded before the face. No. 6 gives a front view of the human skeleton, with the left arm resting on a scythe and the other hanging out from the right hip. (Both these figures are taken from Vesalius.) The last plate (No. 7) represents the skeleton of a long-tailed monkey. Coiter himself drew these figures and each plate is marked v. c. d., Volcher Coiter Designer (designavit).

The other work (1575) by Coiter is of even greater scope and value than the preceding. It bears title as follows:

Lectiones Gabrielis Fallopii de Partibus Similaribus Humani Corporis, ex Diversis Exemplaribus a Volchero Coiter Summa cum Diligentia Collectae.

His Accessere Diversorum Animalium Sceletorum Explicationes Iconibus Artificiosis, et Genuinis Illustratae, quae Omnia Loco

Appendices Anatomicarum Exercitationum prius Editarum, Anatomiae and Philosophiae Naturalis Studiosis Insequere Utiliter Poterunt.

Auctore eodem Volchero Coiter Frisio

Groeningensi, Inclytae Reipublicae Noribergensis Medico Physico et Chirurgo. Noribergae, 1575.

The dedication of this work to the senate of Nuremberg is made and signed by Coiter. The introduction is headed thus:

De Partibus Similaribus Humani Corporis Lectiones Gabrielis Fallopii Mutinensis, ex eiusdem Auditorum Diversorum Scriptis Collectae, Multis in Locis Locupletatae Emendataeque in Capita & Meliorum Ordinem Redactae a Volchero Coiter.

In English this would seem to be about as follows:

The *Lectiones* (selections or readings) of Gabriel Fallopius of Modena, concerning the like parts of the human body, collected from the writings of his various hearers (students?), enriched in many places and divided into chapters, and thus brought into better order by Volcher Coiter.

Just how much of this work is Fallopius's and how much Coiter's, I am not able to read the Latin well enough to make out directly. However, since Fallopius died in 1562, and since the only work of his to appear in his lifetime was his "*Observationes anatomicae*," Venice, 1561, and since Coiter's dedication would seem to indicate that Fallopius's part in his (Coiter's) books consists of gatherings or citations obtained from different men who had heard Fallopius lecture (*auditorum diversorum*), I have little doubt that the book is really Coiter's own work, as I have tried to show in the next paragraph.

An analysis of the contents of this very rare work throws light on the question of its authorship. The introductory chapter deals with the nature of the similar parts of the human

body and it is expressly stated to be taken from Vesalius. Then Coiter himself, under the section heading "De quadrupedium aliquot animalium sceletis," in an introduction and eleven separate short chapters, discusses the skeletons of the following vertebrates: the goat as an example of horned ruminants, the hare, pig, marten, squirrel, hedgehog, mole, bat, lizard (as showing also the structure of other reptiles, "crocodile, skunk, salamander, and newt" [sic], etc.), frog as a representative of other amphibia, and turtle, eleven vertebrates in all. This is undoubtedly Coiter's own work.

The next section is headed "De avium sceletis et praecipuis musculis." This in twelve chapters deals with birds' skeletons in general, with the different parts of birds, with their skulls, necks, breast parts (muscles), clavicles, scapulae, sternums, ribs, lumbar and sacral vertebrae with the pelvic arch and all its adnexae, wing bones, and muscles and manner of flight, and finally their legs and feet. This section also is undoubtedly Coiter's own work.

More to our purpose is the fact that to illustrate this book there are four plates drawn by Coiter himself. On these the skeletons are very much crowded, and do not have the homologous bones lettered as do Belon's skeletons of bird and man. However, of them Choulant says: "The engravings are neat and anatomically exact. The four plates . . . are freely and truthfully executed." Each plate has the initials v. c. d., Volcher Coiter Designavit.

Analysis of these plates reveals on No. 1, the skeletons of a pig, a marten, a hare, and a parrot, four in all. No. 2 has skeletons of a fox, a squirrel,

a frog, a hedgehog, a mouse and a mole, a total of six. No. 3 gives skeletons of a turtle, a goat, a bat, and a monstrous fowl¹ (with an extra leg coming off the left hinder part of the pelvic region), four skeletons in all. And finally No. 4 contains figures of the skeletons of a lizard and of the following birds: starling, crane, cormorant, and skulls of a woodpecker and a wry-neck, six in all. Here then is a total of twenty skeletons of twenty different vertebrates, drawn, described, and compared. So far as I know, nothing like this had ever been done before.

The only copies of Coiter's works accessible to me are in the library of the Medical Society of the County of Kings in Brooklyn. The plates are much faded, and what is worse, are much folded. To photograph one of these would, owing to these defects, give a poor representation of Coiter's work. This situation was relieved by Dr. Singer, who very kindly sent me an excellent reproduction of one of Coiter's plates (Fig. 5) and I can testify that it is a faithful reproduction of Coiter's drawings. Note his signature in the lower right corner.

Perhaps the reader may think that an undue amount of space has been given to Coiter. However, to my mind he richly deserves it. In Leonardo we find (presumably) the first scientist to draw and definitely describe homologous bones in two vertebrate skeletons; while Belon was the first to figure and homologize bone by bone the skeletons of man and a lower vertebrate. Coiter, however, figures and describes in his two books the skeletons of man and apes and twenty lower vertebrates. This original work

¹ This bears the initials G. P. D., George Palm Designer, according to Choulant.

of our Dutch anatomist coming only some thirty years after Vesalius had put human osteology on a sound and

About one hundred years later (in 1680) Cornelius Van Dck published a curious and (historically) interesting

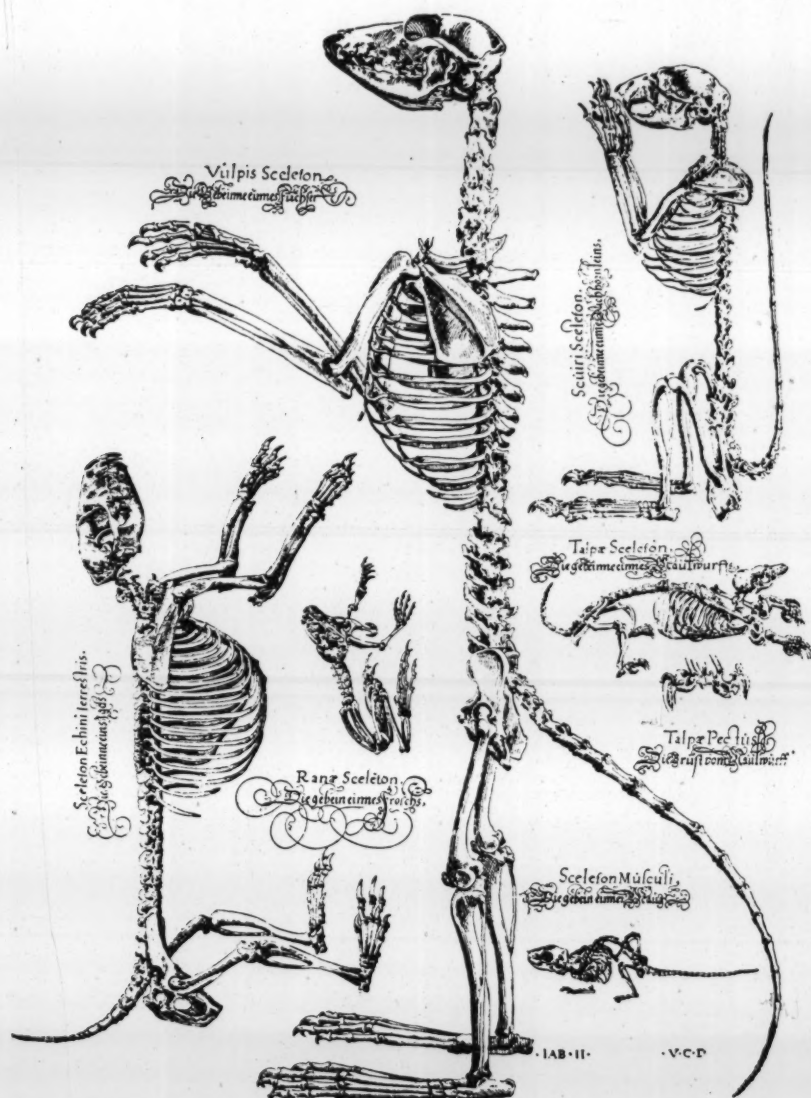


FIG. 5. DRAWINGS OF THE SKELETONS OF A WOLF, A SQUIRREL, A HEDGEHOG, A MOUSE, A FROG, AND A MOLE. (AFTER COITER, 1575.)

accurate basis, surely entitles Volcher Coiter to be called the real founder of comparative osteology.

little book "Osteologia," etc. In this he figures and describes the skeletons of man and nineteen other vertebrates.

These include eight mammals (horse, camel, dog, hog, rabbit, hedgehog, mouse and bat), one amphibian and will not be reproduced here. His engraved frontispiece, however, is interesting as showing a long proces-



FIG. 6. THE FRONTISPIECE OF VAN DYK'S BOOK, 1680, SHOWING A PROCESSION OF VERTEBRATE SKELETONS.

(toad), two reptiles (turtle and snake), and eight birds (eagle, ostrich, turkey, goose, heron, crow, starling and sparrow). The text being in Dutch has not been deciphered, but the figures are poor, are in fact grotesque caricatures. That of the hedgehog has the tail standing vertically on top of and coming out of the middle of the pelvic girdle, its origin being anterior to the junction of the hind limbs with the arch. These drawings have neither scientific value nor artistic beauty,

sion of vertebrate skeletons passing before that of a man, which, seated on a stone, holds a scroll in its hands and apparently checks off the animals as they pass (Fig. 6).

Of the man himself little seems to be known. He writes himself on the title page as "Apotheker, &c. tot Medemblik." He not only prepared the text of his book but drew the plates as is indicated by his signature "C. V. Dyck" on each.

Confining ourselves to illustrations

in comparative osteology, none have been found during the next fifty years which fit in with the purpose of this

shows the skeleton of a cat and the anterior half of a dog's skeleton coming out of a doorway. The tail-



FIG. 7. COMPARATIVE VIEW OF THE SKELETONS OF SPARROW AND BAT. (AFTER CHESelden, 1733.)

paper. Probably such do exist, but they have unfortunately not been chanced upon.

In 1733, William Cheselden, a distinguished surgeon and anatomist of his day, contemplated an extensive work in three volumes on comparative osteography. However, for lack of financial support the project was stopped after one volume had been issued. These drawings were made and reproduced in magnificent style. They are intended to be comparative, as Cheselden states in his preface, but they are not lettered because as the author says: "I thought it useless to make long descriptions, one view of such points showing more than the fullest and best description can possibly do."

A number of the drawings show two skeletons on one block. Thus as a tail-piece to the introduction are beautiful skeletal figures of a crane picking up a fish. The plate to face Chapter II shows the skull of a pike and the lower jaws of several other fishes. The head-piece to Chapter II

piece to Chapter III portrays the skeletons of an eagle and a viper. The head piece to Chapter V shows a sparrow in lateral and a bat (hanging by its claws) in dorsal view. On the plate to face Chapter VII are the skull of a cat in lateral view and the end of a boar's jaw seen from below. Again, the headpiece to Chapter VIII shows the skeletons of "a weasel and a rat" facing each other, the latter standing on a block as high as the head of the weasel. And finally, plate XXXIII shows the skeleton of a nine-year-old boy leaning on the vertically placed skull of a horse.

Among the notable single skeletons in Part I is a magnificent drawing in lateral view of the complete bony parts of an ostrich. Of this we will hear later.

Of the skeletons drawn two on a block, those of crane and fish, and eagle and snake are too dissimilar for their homologies to be easily traced. On the other hand, those of dog and cat, and of "weasel" and rat are too nearly similar to fall in with the

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purpose of this paper. However, the plate of the sparrow and the bat is reproduced as Figure 7. In Belon's been much more strongly emphasized had the bird's skeleton been shown in dorsal view, and preferably hanging

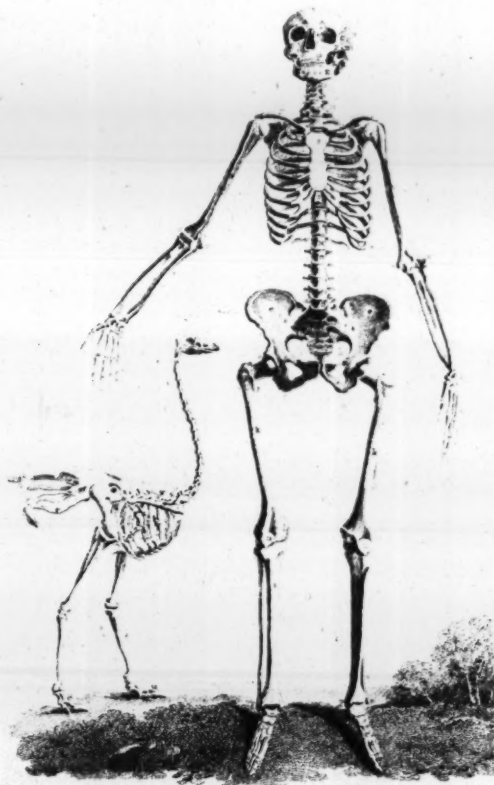


FIG. 8. PLATE TO SHOW HOMOLOGOUS BONES IN OSTRICH AND MAN. (AFTER MITCHELL, 1819.)

figures we have a man and a long-legged bird, in both of which the emphasis is laid on locomotion by the hinder limbs. Now in flying animals, we have the bird and bat whose locomotion is by the anterior limbs, the wings. The marked similarity (homology) betwixt the flying organ in these animals must have forcibly struck other investigators, but I unfortunately know of no other such comparative figures. In Cheselden's plate the comparative values would have

up, and if the homologous bones had been marked.

In 1819 Edward Mitchell, engraver, published a volume of osteological figures for which the explanatory text was supplied by John Barclay, a fellow of the Royal College of Physicians and of the Royal Society of Edinburgh. This work contains a number of plates of man and lower animals to which reference will be made. On the fourth plate are portrayed the skeleton of a woman in

front view taken from Sue, and Cheselden's figure of an ostrich skeleton in lateral view, as may be seen in

of horse and man we must turn to Mitchell also. He takes the figures of a man's skeleton from Albinus and a

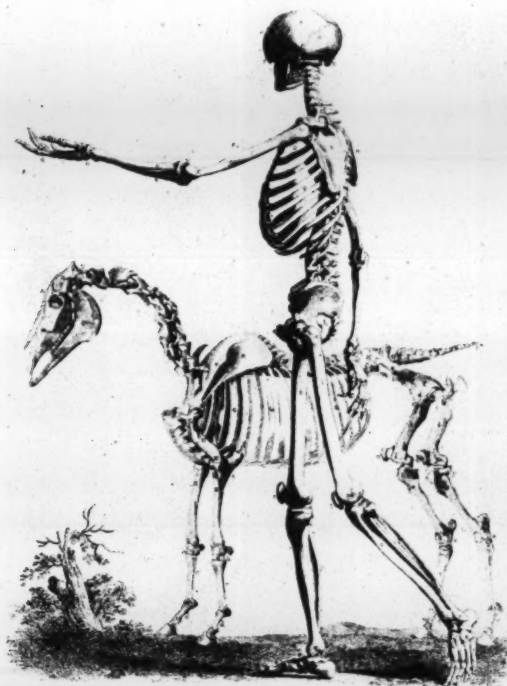


FIG. 9. COMPARATIVE OSTEOLOGY OF MAN AND HORSE; ONE OF THREE VIEWS. (AFTER MITCHELL, 1819.)

Figure 8. Here then we have the latest comparative figures known to me of the osteological structures of man and bird. The letters marking the homologous bones are small and, since the plate has had to be reduced, are almost unreadable without the aid of a magnifying glass, but they are there. It is regrettable that the skeleton of the ostrich was not drawn to the same scale as that of the woman.

We have already considered Leonardo de Vinci's figure comparing the bones in the hind limbs of horse and man. For the first known figures comparing the whole bony structures

horse from Stubbs, and reproduces them in three views (front, rear, and side) in his book. Of these the third plate is reproduced here as Figure 9. It seems hardly necessary to reproduce the front and rear views. These beautiful figures have the like bones marked with the same letter. These letters, already small, are much reduced in my figures, but can be made out with a glass, and the homologous bones identified in each skeleton. Barclay has given a descriptive table in which letters and bones are identified, that is, "A = frontal bone," etc.

At the end of the second part of

Mitchell's work are three separate plates. The first portrays the skeleton of a tuskless elephant with the skele-

never saw the light. They were drawn from skeletons in Barclay's Museum in Edinburgh.

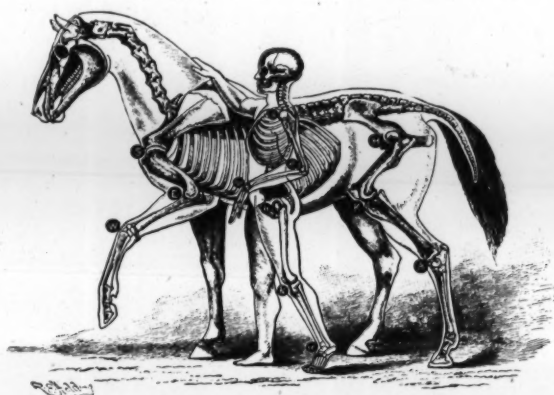


FIG. 10. COMPARATIVE VIEW OF SKELETONS OF MAN AND HORSE. (AFTER FLOWER, 1891.)

ton of a man sitting on its neck and largely hidden by the elephant's skull. The second plate has the skeletons

In 1891 W. H. Flower, the distinguished osteologist, published a book in which his frontispiece gives a

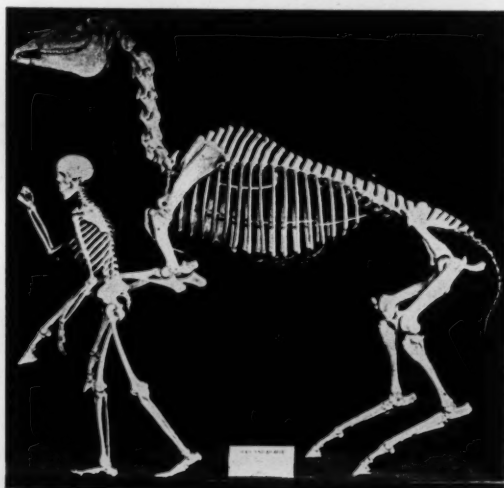


FIG. 11. SKELETONS OF MAN AND HORSE IN THE UNITED STATES NATIONAL MUSEUM MOUNTED BY F. A. LUCAS. (FROM A PHOTOGRAPH LOANED BY DR. LUCAS.)

of two wading birds, and the third, a fine skeleton of a percoid fish. These plates are evidently samples of those for the proposed second volume, which

"comparative view of skeletons of man and horse" (Fig. 10). The joints are lettered alike to show homologies, but the like bones are not so lettered.

However, such homologies are pointed out in a general way in the text. This figure, which does not begin to com-

page 42. Brief mention only of it is made (p. 42), but Dr. Lucas tells me that the principal homologous bones



FIG. 12. "THE BEAR 'HUNT,' A GROUP MOUNTED IN 1900 BY CHARLES H. WARD FOR THE UNIVERSITY OF BUFFALO. (FIGURE BY COURTESY OF MR. WARD.)

pare with Mitchell's in artistic value, seems to have excited general interest and Dr. F. A. Lucas informs me that such a group composed of these two skeletons was prepared under Flower's supervision for the British Museum of Natural History of which he was director. So far as I know no figure of this group was ever published.

Dr. G. Brown Goode saw Flower's group and had a like group prepared for the United States National Museum by Dr. F. A. Lucas, at that time head of its department of comparative anatomy. This, which aroused much interest, was figured as Plate 30 of the Report of the Museum for 1893 (published in 1895) to face

bore identical labels (which, however, do not show in the figure). This is a fine group, as may be seen from Figure 11 herein; probably the best ever made up to that time (1893).

In 1900, Mr. Charles H. Ward of Rochester, N. Y., prepared the most elaborate osteological group ever exhibited so far as I know. It portrays a hunting scene in which the dramatic personae are a black bear and his attackers, a dog, and a man mounted on a rearing horse. Mr. Ward has kindly loaned me a figure of this fine group (Fig. 12). Here the bear is standing on his hind legs trying to ward off with his forepaws the leaping dog and the horse which has reared to

strike him with his hoofs, as well as the spear which the man is endeavoring to thrust into his heart.

identify the homologous bones in four typical and commonly known animals: a plantigrade omnivore, a carnivore,

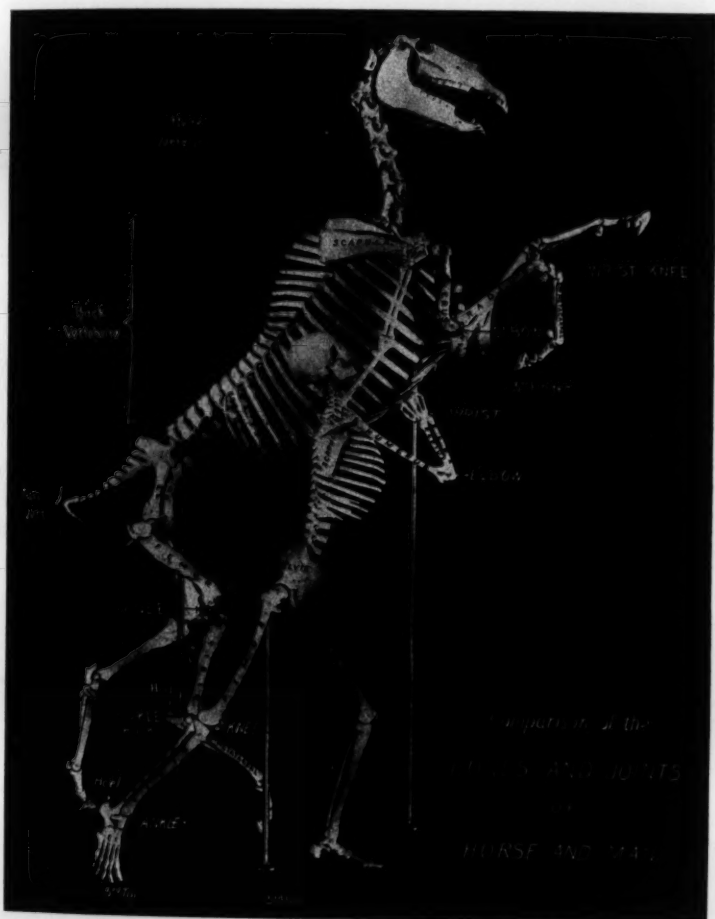


FIG. 13. SKELETONS OF MAN AND REARING HORSE. PHOTOGRAPH OF A GROUP BY S. H. CHUBB IN AMERICAN MUSEUM OF NATURAL HISTORY.

This group, which required about a year for its preparation, and was so far as I know the first one ever made from photographs of the animals in action, was mounted by the order of Dr. Charles Cary, and by him presented to the museum of the University of Buffalo. It was intended to enable medical and other students to

a one-toed herbivore and man himself. So far as I know the figure has never before been published save in a catalogue of Mr. Ward's osteological preparations.

Last of all for skeletons of man and horse we come to the wonderful group of the man and the rearing horse in the American Museum (Fig.

13), prepared by Mr. S. H. Chubb. Here the two skeletons are mounted in identical positions, making absolutely easy the identification, bone by bone. One cannot speak too highly of the artistic elegance and scientific accuracy of this magnificent group. It speaks for itself and needs but few words of explanation. First, however, its history may briefly be indicated.

Mr. Chubb spent in all about three years making studies (largely photographic, both still and moving pictures) of horses, getting together, preparing, and mounting his skeletons. Of this time at least one half, or more than eighteen months, was spent in the actual work of making the group. Such groups are expensive in a ratio out of all proportion to the size of the group, and for this particular one the Museum is indebted to the munificence of Mr. W. R. Whitney. The group was first put on exhibition in May, 1904, and was first figured (without the lettering shown in my reproduction) in an address by Professor Henry Fairfield Osborn, "Origin and History of the Horse" at a meeting of the New York Farmers at the Metropolitan Club on Dec. 19, 1905.

This group fits in admirably with the Museum's wonderful series of mounted fossil horses, since this horse is the latest and highest stage of evolution in the horse. Realizing that, from the standpoint of teaching evolution, the non-scientific visitor should be able to homologize the two skeletons bone for bone, Prof. Osborn had an enlarged photograph made and appropriately labelled for homologous bones and joints. This improved figure was first reproduced in a second article published by Prof. Osborn in 1913, "The Horse Past and Present in the American Museum of Natural

History and in the Zoological Park." Finally the original (unlabelled) figure is given in "No. 36, Guide Leaflet Series to the Museum;" "Evolution of the Horse" by W. D. Matthew and S. H. Chubb. In addition this ever-popular illustration has been reproduced many times in newspapers and magazine articles.

Perhaps I cannot better state the purpose of this work of art and science than to quote from the label accompanying it:

This exhibit is designed to illustrate the latest stage in the development of the horse and the close association of the animal with man. The study is faithfully worked out from instantaneous photographs and is suggestive of the breaking and training of the horse by man. The rearing action suggests unwilling subjection and the position of the man—as if holding a bridle—one of intellectual control. The two skeletons are so placed as to facilitate comparison. The limbs of the horse, moving only forward and backward, have much less freedom of motion than those of man. Note the "ball and socket" joint of man at the shoulder and hip, the rotary movement of the radius at the elbow and the flexibility at the wrist and ankle, and compare with the restricted movement at the shoulder of the horse, the hinge-like joint at the elbow, and the limited movement at the wrist ("knee") and ankle ("hock").

The likeness of the skeletons of the higher apes to that of man has long attracted the attention of thoughtful men, and many have been the portrayals of their skeletons to show the homologies. As we have seen, Coiter as early as 1573 and 1575 compared the skeletons of tailless apes and that of man. One of the earliest, most famous, and most scientific of these studies was that by Edward Tyson in his treatise entitled "*Orang-outang,*

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sive *Homo sylvestris*: or the Anatomy of a Pygmic compared with that of a Monkey, an Ape, and a Man" pub-

made out. This figure with its original legend is reproduced here as Figure 14. It has been often reproduced,

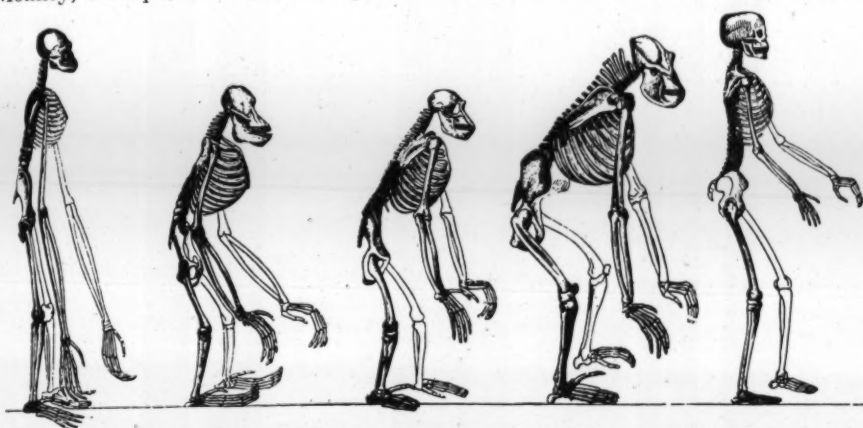


FIG. 14. "SKELETONS [FROM LEFT TO RIGHT] OF THE GIBBON, ORANG, CHIMPANZEE, GORILLA, MAN. PHOTOGRAPHICALLY REPRODUCED FROM DIAGRAMS OF THE NATURAL SIZE (EXCEPT THAT OF THE GIBBON, WHICH WAS TWICE AS LARGE AS NATURE), DRAWN BY MR. WATERHOUSE HAWKINS FROM SPECIMENS IN THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS." (ORIGINAL LEGEND.)

lished by the Royal Society of London in 1699. This devotes six chapters (twenty-seven quarto pages) to a discussion of the osteology and a comparison of the individual bones with those of man, illustrated by a complete well-drawn skeleton of the ape alone. As is well known, the "Pygmic" dissected by Tyson was a chimpanzee, one of the distinctively man-like apes.

Other like comparisons of the bony framework of man and apes might be quoted but the limits of this paper forbid. The whole subject has been admirably and adequately treated by Huxley, to whose book ("Man's Place in Nature," London, 1863; another edition, London, 1897) the interested reader is referred. The frontispiece to this gives in right lateral view the skeletons of all the anthropoid apes (gibbon, orang, chimpanzee and gorilla) and man. In these the homologous bones may be readily

notably in the 5th edition (and probably also in earlier issues) of Ernst Haeckel's "Anthropogonie" (Band 2, page 672, Leipzig, 1903); and on page 798 (Plate xxvi) Haeckel portrays the skeletons of man and gorilla drawn to the same size. This latter figure is also found on page ii of Volume 1 of a work entitled "Living Animals of the World" by C. J. Cornish and others. With Huxley's figure before us it does not seem necessary to reproduce this and all the more because the enlargement of the gorilla's skeleton gives a very startling and inartistic effect.

Much later than Huxley's figure is a similar one by Wilhelm Leche ("Der Mensch," Jena, 1922, p. 287) portraying the same series of skeletons from specimens in the Zootomical Institute of the University of Stockholm. These are shown in front view in light grey on a black background and are not well printed. For reasons

identical with those set forth above they also will be omitted. However, there will be given as the last and

to portray the homologous structure in the bones of the leg of man and horse, and those by Belon to homo-

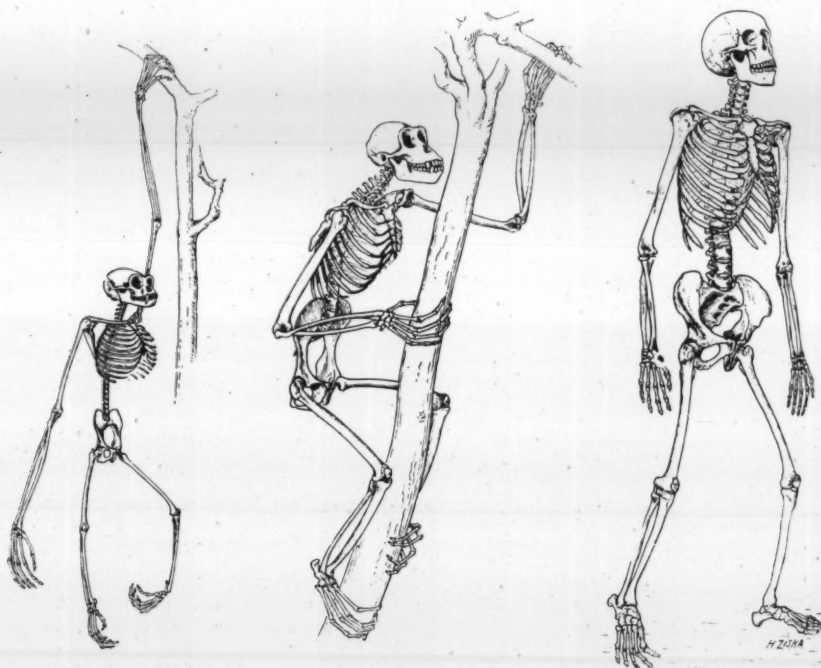


FIG. 15. SKELETONS (FROM LEFT TO RIGHT) OF A GIBBON, A CHIMPANZEE, AND A MAN. (AFTER GREGORY, 1928.)

newest illustration of comparative osteology, part of a large figure prepared under the direction of Dr. W. K. Gregory, head of the department of comparative anatomy in the American Museum of Natural History. This illustration (Fig. 15) portrays, from a front-lateral viewpoint, the skeletons of a gibbon, a chimpanzee, and a man. As will be seen this drawing combines in a remarkable degree artistic beauty and anatomical accuracy. In the three skeletons, one can homologize bone with bone from head to foot.

We have now traversed the field from the first attempts by Leonardo

gize bone by bone the skeletons of bird and man, to Gregory's beautiful figures of the skeletons of two of the higher apes and of man. Had the literature been searched carefully, doubtless other interesting figures could have been found, but our title emphasizes the word *some*. My effort has been to show the earliest beginnings of portrayals of skeletons in comparison, since these are relatively unknown, and of later ones to show only those having alike great scientific interest and great artistic value. If I have done so and have interested the reader in the subject, I will feel amply repaid.

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[From Erastus: *Varia Opuscula Medica*. Francofurdi, 1590.]

EDITORIAL

MEDICAL MANUSCRIPTS

Although many of the medical libraries in the United States possess notable collections of incunabula, or other rare books, there is one important feature in which they are deplorably lacking, namely, manuscripts. It would seem that, with a few notable exceptions, American collectors of medical libraries have not been as enthusiastic in this field as they have in the pursuit of incunabula, and yet the opportunities for accumulating valuable manuscripts are as open to him who has the knowledge to seek, and the means to buy, as they are in any other collecting field.

Mr. Victor G. Plaar, the Librarian of the Royal College of Surgeons of London, has just completed a catalogue of the manuscripts in the possession of the College, the perusal of which serves to show not only the extent of the great collection of that institution, but also the value and interest it has for the profession. First among the treasures we would naturally find the manuscripts appertaining to John Hunter, and the Hunter collection. Although Mr. Plaar omits mention of many of these, because they were already mentioned by James B. Bailey in his list, published in 1891, nevertheless he is able to list an astonishing number of manuscripts, notebooks, letters, and other material written by John

Hunter, William Clift, and others, many of them of the first importance. The Hunter-Baillie collection of ten volumes of manuscripts, presented by Mr. Hunter-Baillie, the son of Matthew Baillie, and his daughter, who gave five volumes in 1895 and five in 1926, contains much material of great historic value as well as personal interest. Among the items are the ms. poems of Mrs. John Hunter, including "My Mother bids me bind my hair;" the ms. account of John Hunter's boyhood dictated by his mother to Joanna Baillie; a commonplace book, belonging to an uncle of the Hunters, in which he has entered various matters of family interest, among other things giving the date of John Hunter's birth as February 9, 1728, which coincides with the date in the Hunter Family Bible, and would therefore furnish further evidence that the usually adopted statement that he was born in the night of February 13-14 is wrong; a hitherto entirely unnoticed notebook of Matthew Baillie, recording his travels on the Continent, and relating much of interest concerning the hospitals and museums he visited; lastly, a great number of autographed letters from prominent persons in England and France. This group of material alone would constitute an invaluable collection.

The great English surgeons of the eighteenth and nineteenth centuries

are well represented by the manuscripts of their writings, and letters written by, or to them.

From Percival Pott, Henry Cline, Astley Cooper, Abernethy and Brodie, we pass to their successors Paget and Lister. It would seem as though a consecutive narrative of the surgery of London could be woven out of this collection of its representative body. Edward Jenner is represented by the manuscript of his "Inquiry into the Medical History of a Disease known in Gloucestershire as the Cow Pox." 1789, and by a number of letters.

The "Lister Memorial" papers are probably the most intrinsically interesting group in the collection, after the Hunter papers. They include commonplace books, notebooks, notes for lectures, and many drawings and notes on experiments. Among older manuscripts, there is one by Sir Theodore Turquet de Mayerne, which he precedes by an account of his family, and an account of the case of Sir Thomas Lyttelton written by Richard Mead. A manuscript of the greatest interest to all students of the medical writings of the Ancients is that of a "Lexicon of Greek medical

terms with references to Greek authorities," written by W. A. Greenhill, the famous English scholar. Although unfinished, it is a great pity that such a work should not be published, as it would be of the greatest use to those who wish to study the Greek medical classics.

Of less scholarly, but of much human interest, is the "Diary of a Resurrectionist, kept during parts of the years 1811 and 1812," written by Joshua Naples, a notorious follower of the trade. This amusing work has been published by J. B. Bailey with interesting notes and illustrations.

The letters from Sir Walter Scott to Joanna Bailey were described by Mr. Plaar in the *Edinburgh Review*, in 1912-1913.

And so we might go on with a recital of the contents which are contained in this great collection. We owe a debt of gratitude to the skill, as well as industry of the accomplished Librarian of the Royal College of Surgeons. We can only trust that his work may arouse our collectors and librarians to a realization of their opportunities to lay foundations for the future in their own collections.





CORRESPONDENCE

To the Editor:

May I have space in your columns to ask your readers, should any of them possess or know of a copy of Paré's "Oeuvres," to describe for me: (1) the position of the portrait; (2) whether it is signed by Vallée (aged seventy-five, 1585) or by Horbeck (aged seventy-five, 1584); (3) whether it is inserted on a separate leaf or is pasted on a blank page of the original preliminary sheets; (4) whether the binding is old or modern.

This seems to be the rarest of the many editions of Paré's Works. The only copies I have been able to trace

in any libraries are one in the Bibliothèque Nationale and two copies in the New York Academy of Medicine, one of them wanting the portrait. The other two have the Vallée portrait. Two copies of the 1585 edition have recently been in the trade, each of which contain the Horbeck portrait, one of them being in an old binding which makes it appear that the 1585 edition may not have been uniform in always having the Vallée portrait.

HARVEY CUSHING.

305 Walnut Street,
Brookline, Mass.





BOOK REVIEWS

THE SACK-'EM UP MEN, AN ACCOUNT OF THE RISE AND FALL OF THE MODERN RESURRECTIONISTS. By James Moores Ball, M.D., LL.D. Edinb., Oliver and Boyd, 1928.

The history of the means by which human remains have been procured for the purpose of studying and teaching anatomy has been one of the by-paths of medical history which has attracted much attention and about which much has been written. This interest in so gruesome a subject is not due solely to its macabre character, but because of the vital importance which it possessed for the very foundation of all medical science. Religious prejudice, popular superstition and the innate respect for the dead which is deeply rooted in the human mind, all combined to thwart the anatomist's demand for the necessary material for study.

Although Dr. Ball professes only to deal with the modern phases of the subject, he gives a very interesting summary in the early part of his book of the conditions which prevailed in antiquity and during the Middle Ages, and recounts the difficulties which beset Vesalius and his followers when they were laying the foundations of modern anatomy. The main part of his work is, however, devoted to the doings of the Resurrection Men of Edinburgh and London, whose crimes led to the enactment of laws by means of which an ample supply of anatomical material is insured to teachers and students. The story of Burke and Hare and their two female accomplices is retold with a vividness and completeness which we have not encountered in any other recital of their monstrous iniquities. The pathetic figure of Robert Knox, the Edinburgh anatomist, whose downfall resulted from the revelations at their trials, of his too ready acceptance of any of the

bodies brought to him without in any way questioning the source from which they were derived. Knox had as assistants in his dissecting two men who subsequently achieved high positions in the profession, William Ferguson and Thomas Wharton Jones. It was they who actually received and paid for the bodies brought to the dissecting room, and on them, even more than on Knox, the blame of not suspecting that the bodies brought to them were obtained by crime should fall; yet after a brief period of unpleasant notoriety their share in the matter was apparently forgotten, and certainly forgiven. Although no less than sixteen murders were traced to Burke and Hare and their paramours, Burke was the only one of the quartet who was duly punished. He was hung, and the others were acquitted or turned king's evidence.

Dr. Ball gives much about that most diverting little book "The Diary of a Resurrectionist," which republishes the diary kept by James Naples, the leader of a gang of Resurrectionists who plied their trade in London, and he tells of the crime of Bishop and Williams, who were hanged for the murder of a young Savoyard boy in London. After reviewing the steps which led up to it, he details the passage of the "Warburton Anatomy Act" in 1832, which finally satisfied the needs of the anatomists by providing an ample supply of legally procurable subjects throughout England, Scotland and Ireland. The last chapter reviews the history of the subject in the United States. Although the story is not so sensational it was much the same until the enactment by the different states of laws regulating the matter.

Dr. Ball's book is not only an authoritative and complete history of an important phase of medical history, but also

a most delightfully interesting narrative, told with vivacity and humor far surpassing much of the fictional literature which has grown up on the subject. It is copiously and well illustrated throughout, and deserves a wide circle of readers.

FRANCIS R. PACKARD.

RENÉ THÉOPHILE HYACINTHE LAËNNÉC. A Memoir. By Gerald B. Webb, M.D. N. Y. Paul B. Hoeber, Inc., 1928.

This little book represents in revised and amplified form the address given February 9, 1926 by special invitation before the Denver Clinical and Pathological Society when that organization undertook to celebrate at its annual mid-winter historical meeting the centenary of the death of Laënnec.

From time to time during the past twenty-five years, many delightful essays on Laënnec, notably those of Osler, Thayer, Walsh and Robinson to name only a few, have appeared in the English language in one place or another, but admirable as these have been they were in style and substance essays and not biography. They all lacked one very important feature, an authoritative narration of the history of an extremely interesting life.

Until the appearance of Hale-White's "Selected Passages from Laënnec" the student was dependent for historical details in the English language upon these scattered essays and the prefaces by John Forbes to the English translations of "L'Auscultation Médiante."

Strange to say the Encyclopedia Britannica fails to list a separate article on Laënnec. Sir Clifford Allbutt in his section on the History of Medicine devotes a scant hundred words to the discussion of auscultation.

In writing, then, a much needed and very satisfactory biography, Dr. Webb has drawn his data on the life of Laënnec chiefly from the two volumes of Rouxau: "Laennec avant 1806" (Paris, 1912) and "Laennec apres 1806" (Paris, 1920). One conjectures that for his sympathetic

appreciation and light touch so manifest on every page Dr. Webb may be indebted to his Huguenot mother to whose memory (jointly with wife and children) he dedicates his book.

The style is charming and not too technical, many pages contain truly brilliant flashes. Layman and physician alike will find it profitable and delightfully easy reading.

The volume is the fifth in Hoeber's series which includes Rührh's "William Cadogan, His Essay on Gout," Riesman's "Thomas Sydenham," etc. The book is also issued in a de luxe edition.

JAMES J. WARING, M.D.

CARDIO-VASCULAR DISEASES SINCE HARVEY'S DISCOVERY. (The Harveian Oration delivered before the Royal College of Physicians of London on 18th. October, 1928). By Sir Humphry Davy Rolleston, Bart., K.C.B., M.A., M.D. Cambridge Univ. Press, 1928.

This is a valuable addition to the literature brought forth in honor of the Tercentenary of the publication of the "De Motu Cordis," and one which would have been most in accord with its Author's sentiments as expressed in a quotation from Sir John Freind which Sir Humphry Rolleston gives in his Introduction: "From this discovery of our great countryman (Harvey) many improvements, even in the cure of distempers, might be made: he had thoughts of composing such a work himself, to show the advantages of this doctrine, in relation to practice, but was prevented by sickness and death: the design of the Architect was very noble, and I wish some of his successors might finish it." As Rolleston remarks, the difficulties of such a task have been vastly increased as the years have passed, our whole knowledge of diseases of the cardiovascular system being based on the foundations established by Harvey.

Rolleston gives a broad classification of such knowledge into (1) the accumulation of data provided by anatomical observation, normal and morbid; (2)

unaided clinical observation; (3) as the result of the application of instruments of precision to the examination of patients and (4) probably most important, the information derived from physiological and pathological experiments. Under each of these headings, with most wonderful discrimination, and with the broadest grasp of the subject, Sir Humphry has told the story of the discoveries and observations which have gradually built up the present scientific knowledge of the pathology and treatment of diseases of the circulation. At the end of each section he has placed a concise bibliography containing all the essential references, so that this little book of some 140 pages is really a very complete textbook on cardiovascular diseases. The charming style in which it is written conceals the condensation which the Author has necessarily been obliged to employ in order to cover so large a subject in such a small space. It is hoped and believed that it will enjoy a much wider circulation than falls to the lot of so many of the Harveian orations.

Its wide range of usefulness should place it in the library of every man who desires to keep abreast of the knowledge of one of the most important of medical sciences.

WILLIAM HARVEY. By Archibald Malloch, M.D., M.R.C.P. (Lond.). N. Y., Paul B. Hoeber, Inc., 1929.

The Librarian of the New York Academy of Medicine has added a most valuable and delightful contribution to the literature elicited by the tercentenary of the publication of Harvey's "De Motu Cordis." The biography of the great man is fully presented in all its aspects and Dr. Malloch has added to it two stories concerning Harvey which are not to be found in the most usually consulted accounts of Harvey's life. One of these concerns his investigation of the case of a reputed witch whom he visited personally and saved from pursuing a career which would probably have ended

on the gallows by destroying a toad which the old crone regarded as her familiar. The other refers to a calculus which Harvey was supposed to have removed from his own bladder by cutting himself but which John Finch, writing of it, says he believes must have been voided by the natural channels as "it was possible for him in two dayes to be able to goe abroad." We agree with Mr. Finch. Harvey's great discovery and the steps which led up to it are fully described. The book concludes with an excellent list of the authorities consulted which will be valuable to any future investigator of Harvey's life and work. The 10 full page plates and 3 text illustrations are well chosen and beautifully reproduced. Every student and lover of Harvey will wish to have Dr. Malloch's comprehensive and beautiful little book on his shelves.

FRANCIS R. PACKARD.

INTERCOLONIAL ASPECTS OF THE REVOLUTION, WITH ESPECIAL REFERENCE TO THE NORTHERN TOWNS. By Michael Kraus. N. Y., Columbia Univ. Press, 1928.

This very useful work contains much of value to those who are interested in the early history of medicine in this country, especially because along with the clergymen and lawyers, the doctors in colonial times generally were the most prominent representatives of such culture as existed in the communities where they lived. This fact is emphasized in Chapter VII, entitled "Physic and Physicians," in which we are almost startled by the number of young men who went over to England or the Continent to complete their medical studies before settling in practice in the Colonies. In order to meet the requirements for the medical degree, which most of them obtained, a high degree of academic study was requisite, and as a consequence these men were not only well qualified as physicians, but possessed a considerable degree of general culture. Their very residence abroad, generally for one or more years, was

calculated to broaden their views. In the succeeding chapter, entitled "Science and Curiosity," one is struck with the number of these colonial physicians who pursued scientific study and research, outside of their strictly professional lines. Many achieved prominence as botanists, meteorologists, and physicists, the work of their fellow-countryman, Benjamin Franklin, in electricity interesting them especially.

Aside from the two chapters referred to above the whole book is of great interest as a study of the state of culture in the colonial period in this country.

One point which the Author brings prominently forward is that the culture which existed in the different colonies seemed as a band of union between the men who possessed it, which furthered very greatly the political union of the colonies when the struggle with the mother country came to a head. Cadwallader Colden of New York, John Morgan of Philadelphia, John Lining of Charleston, and John Warren of Boston, with the group of cultivated men who surrounded them, were all correspondents with one another, and looked up, as to a mentor, to Benjamin Franklin. Such an interrelationship must have done much to further the union of all the best elements of the various colonies to promote their cause in the great struggle for freedom.

OPUSCULA SELECTA NEERLANDICORUM DE ARTE MEDICA. Fasciculus Septimus quem Curatores Miscellaneorum quae Vocantur. HET BOECK VAN SURGIEN VAN THOMAS SCCELLINCK VAN THIENEN. Nederlandsch Tijdschrift voor Geneeskunde Collegerunt et Ediderunt. Amsterdam, Sumptibus Societatis, 1928.

The seventh volume of this series of Dutch medical opuscula varies from previous volumes¹ not only in being entirely devoted to one classic, Master Scellinck's "Book of Surgeries," but also in possessing more illuminating introductions and annotations. While the text of the original work is entirely in Dutch, an English translation of Preface and Introduction adds considerably to the convenience of the English-speaking reader.

Among the few medieval Dutch medical manuscripts that have been preserved is one of the 14th century in the British Museum (Ms. Harl. 1684), which contains *inter alia* a transcript from the Surgery of Thomas Scellinck. The editor of the Opuscula, van Leersum, was put on the trail of this manuscript by his study of Yperman's "Cyrurgie," and the late Dr. Geijl found a fuller transcript manuscript in the Royal Library at the Hague. The present edition of Scellinck's work, which is also the first time it has ever been printed, is taken chiefly from the Hague manuscript, but profits by both versions. An original work of a surgeon of experience, who "notwithstanding his respect for the Graeco-Arabian tradition . . . prefers to trust what his own eyes have seen," this we may well believe is an important contribution to our knowledge of medieval surgery in the Netherlands. In fact, it may with justice be ranked immediately after Yperman's "Cyrurgie." Would that the editor had included a translation of this ancient Dutch into English, French or German!

E. B. KRUMBHAAR.

¹ See my review in ANN. MED. HIST., 10: 104, 1928.

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Portrait of SIR CHRISTOPHER WREN, by Kneller
[1632-1723]



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